THE

MINIATURE FRUIT GARDEN

BY

THOMAS RIVERS.

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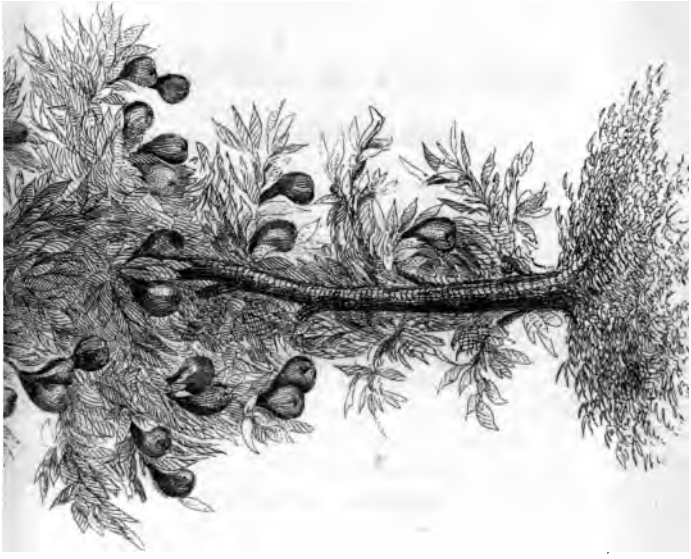

THE

MINIATURE FRUIT GARDEN;

OR,

THE CULTURE

OF

PYRAMIDAL AND BUSH FRUIT TREES;

WITH INSTRUCTIONS FOR ROOT-PRUNING,

&c. &c.

BY THOMAS RIVERS.

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INTRODUCTION.

My attention was drawn to the benefits fruit trees derive from root-pruning and frequent removal about the year 1810. I was then a youth, with a most active fruit-appetite, and if a tree bearing superior fruit could be discovered in my father's orchard-like nursery, I was very constant in my visits to it.

In those days there was in the old nursery, first cropped with trees by my grandfather about the middle of the last century, a "quarter"—*i. e.*, a piece of ground devoted to the reception of refuse trees—of such trees as were too small or weak for customers, so that in taking up trees for orders during the winter they were left, and in spring all taken up and transplanted to the "hospital quarter," as the labourers called it. The trees in this quarter were often removed—they were, in nursery parlance, "driven together" when they stood too thinly in the ground; or, in other words, taken up, often annually, and planted nearer together on the same piece of ground. This old nursery contained about eight acres, the soil a deep reddish loam, inclining to clay, in which fruit trees flourished and grew vigorously. I soon found that it was but of little use to look among the young free-growing trees for fruit, but among

the refuse trees, and to the "hospital quarter" I was indebted for many a fruit-feast—*such* Ribston Pippins! *such* Golden Pippins!

When I came to a thinking age, I became anxious to know why those refuse trees never made strong, vigorous shoots like those growing in their immediate neighbourhood, and yet nearly always bore good crops of fruit. Many years elapsed before I saw "the reason why," and long afterwards I was advised by a friend, a F.H.S., to write a crude, short paper on the subject, and send it to be read at a meeting of the Horticultural Society: this paper is published in their "Transactions." I had then practised it several years; so that I may now claim a little more attention, if the old adage that "practice makes perfect" be worthy of notice.

This little work is not designed for the gardens and gardeners of the wealthy and great, but for those who take a personal interest in fruit tree culture, and who look on their gardens as a never-failing source of amusement. In some few favoured districts, fruit trees, without any extra care in planting and after-management, will bear good crops, and remain healthy for many years. It is not so in gardens with unfavourable soils; and they are greatly in the majority. It is to those possessing such, and more particularly to the possessors of small gardens, that the directions here given may prove of value. The object constantly had in view is to make fruit trees healthy and fruitful by keeping their roots near the surface. The root-pruning and biennial removal so earnestly recommended are the proper means *to bring about* these results, as they place the

roots within the influence of the sun and air. The ground over the roots of garden trees as generally cultivated is dug once or twice a year, so that every surface-fibre is destroyed and the larger roots driven downwards: they, consequently, imbibe crude watery sap, which leads to much apparent luxuriance in the trees. This in the end is fatal to their well-doing, for the vigorous shoots made annually are seldom or never ripened sufficiently to form blossom-buds. Canker then comes on, and although the trees do not die they rarely give fruit, and in a few years become victims of bad culture, existing in a sort of living death.

There is, perhaps, no fruit tree that claims or deserves our attention equal to the pear. How delicious is a fine melting pear all the winter months! and to what a lengthened period in the spring may they be brought to table! Till lately Beurré Rance has been our best spring pear; but this is a most uncertain variety, rarely keeping till the end of May, and often ripening in January and February.

The new Belgian pears, raised by the late Major Esperen, and Monsieur Grégoire, are likely for the present to be the most valuable for prolonging the season of rich melting pears; and of these Josephine de Malines and Bergamotte d'Esperen are especially deserving of notice; they have the excellent quality of ripening slowly. But improvement will, I have no doubt, yet take place; for pears are so easily raised from seed, and so soon brought into bearing by grafting or budding them on the quince stock, that new and valuable late pears will soon be as plentiful as new roses.

In the following pages it will be seen that I strongly advocate the culture of pyramidal fruit trees. This is no new idea with me. I have paid many visits to the Continental gardens during the greater portion of my active life of business, and have always admired their pyramidal trees when well managed, and I have for many years cultivated them for my amusement; but, owing to a seeming prejudice against them among some English gardeners, I was for some time deterred from recommending them, for I thought that men older than myself must know better; and when I heard some of our market-gardeners and large fruit-growers in the neighbourhood of London scoff at pears grafted on the quince stock, as giving fruit of very inferior flavour, I concluded, like an Englishman, that the foreigners were very ignorant, and very far behind us in the culture of fruit trees.

It was only by repeated visits to foreign gardens that this prejudice was dispelled; and when I saw the beautiful pear trees in the Jardin des Plantes at Paris, under the management of Monsieur Cappe, alluded to in *Gardeners' Chronicle*, No. 28, 1847, I felt convinced that our neighbours excelled us in the management of fruit trees adapted to the open borders of our gardens. I have, therefore, endeavoured to make the culture of pyramidal trees easy to the uninitiated; and, having profited largely by experience in attending to it with my own hands, I trust that my readers will benefit by the result.

A humid mild climate seems extremely favourable to the well-doing of the pear on the quince stock. *Jersey*, with its moist warm climate, as is

well known, produces the finest pears in Europe: these are for the most part from trees on quince stocks. The western coast of Scotland, I have reason to know, is favourable for the culture of pear trees on the quince; and within these very few years Ireland has proved remarkably so, more particularly in the south, where some of our finest varieties of pears on quince stocks are cultivated with perfect success.

PYRAMIDAL PEAR TREES ON THE QUINCE STOCK.

THERE is, I think, no description of fruit tree so interesting to cultivate in our gardens as the pyramid,—a name adopted from the French, the originators of this species of culture. The word conical would, perhaps, convey a better idea of the shape of such trees, but as pyramidal trees are now becoming familiar things in English gardens, it is scarcely worth while to attempt to give a new name to these very pretty garden trees.

For gardens with a moderately deep and fertile soil, pears budded on the quince stock will be found to make by far the most fruitful and quick-bearing trees; indeed, if prepared by one or two removals, their roots become a perfect mass of fibres, and their stems and branches full of blossom-buds. Trees of this description may be planted in the autumn, with a certainty of having a crop of fruit the first season after planting,—always recollecting that a spring frost may destroy the blossoms unless the trees are protected. It must always be recollected that pears on quince stocks are strictly garden trees, and not adapted for orchards.

The most eligible season for planting pyramidal pear trees is during the months of November and December, but they may be planted even until the end of March; in planting so late, no fruit must be expected the first season. If root-pruned

pyramidal trees be planted, it will much assist them if about half the blossom-buds are thinned out with a penknife just before they open; otherwise these root-pruned trees on the quince stock are so full of them, that the tree receives a check in supporting such an abundance of bloom. About ten or fifteen fruit may be permitted to ripen the first season; the following season two or three dozen will be as many as the tree ought to be allowed to bring to perfection; increasing the number as the tree increases in vigour, always remembering that a few full-sized and well-ripened pears are to be preferred to a greater number inferior in size and quality.

In the engraving at the commencement of this little volume I have given a faithful portrait of a pyramidal tree of the Beurré de Capiaumont pear, budded on the quince: this was taken in 1846; the tree was then about ten years old, and had been root-pruned three times. Nothing could be more interesting than this tree, only six feet high, laden with fruit of extraordinary beauty; for in my soil, pears on quince stocks produce fruit of much greater beauty and of finer flavour than those on pear stocks. I have, however, introduced the figure as much to show its imperfection as its beauty: it will be observed that its lower tiers of branches are not sufficiently developed; this was owing to neglect when the tree was young—the upper branches were suffered to grow too luxuriantly. Summer pinching in the youth of the tree is the only remedy for this defect, if it be not well furnished below; and a severe remedy it is, for *all* the young *shoots* on the upper tiers, including the leader,

must be pinched closely in May and June, till the lower ones have made young shoots of a sufficient length to give uniformity to the tree. This requires much attention.

The quenouille, or tying-down system, is not practised in France at the present day; and, in truth, it does look very barbarous and unnatural. The trees trained in this manner in the Potagerie at Versailles are mostly on quince stocks; they are from twenty to forty years old, and are very productive, but very ugly; all the shoots from the horizontal and depressed branches are cropped off apparently in July, as M. Puteau, the director, is, I believe, adverse to the pinching system of M. Cappe. I have not for many years observed a single quenouille in Belgium; all are pyramids, even in the gardens of the cottagers, and in general they are very beautiful and productive trees. In many cases, when on the pear stock, they are too luxuriant, and require root-pruning; but this is not understood by continental fruit-tree cultivators.

Pyramids and bushes are the trees best adapted for small gardens, and not standards such as are planted in orchards. To those conversant with such matters, I need only point to the very numerous instances of rich garden ground entirely ruined by being shaded by large spreading standard, or half-standard, unpruned fruit trees. Now, by cultivating pyramidal pears on the quince—apples in the same form on the paradise stock—the cherry as pyramids and dwarf bushes on the Cerasus Mahaleb—and the plum as a pyramidal tree—scarcely any ground will be shaded, and more abundant crops and finer fruit will be obtained.

THE YOUNG PYRAMID.

If a young gardener intends to plant, and wishes to train up his trees so that they will become *quite* perfect in shape, he should select plants, one year old, from the bud or graft, with single upright stems; these will, of course, have good buds down to the junction of the graft with the stock. The first spring, a tree of this description should be headed down, so as to leave the stem about eighteen inches long. If the soil be rich, from five to six and seven shoots will be produced; one of these must be made the leader, and if not inclined to be quite perpendicular, it must be fastened to a stake. As soon, in summer, as the leading shoot is ten inches long, its end must be pinched off; and if it pushes forth two or more shoots, pinch off all but one to three leaves, leaving the topmost for a leader. The side shoots will, in most cases, assume a regular shape; if not, they may be this first season tied to slight stakes to make them grow in the proper direction. This is best done by bringing down and fastening the end of each shoot to a slight stake, so that an open pyramid may be formed—for if it is too close and cypress-like, enough air is not admitted to the fruit. They may remain unpruned till the end of August, when each shoot must be shortened to within eight buds of the stem. This will leave the tree like the annexed figure (Fig. 1), and no pruning in winter will be required.

The second season the trees will make vigorous growth: the side shoots which were topped last August will each put forth three, four, or more shoots. In June, as soon as these have made four leaves, they must be pinched off to three

leaves, and if these spurs put forth shoots, which they often do, every shoot must be pinched down to one leaf, *all but the leading shoot of each side branch;* this must be left on, to exhaust the tree of its superabundant sap, till the end of August. The perpendicular leader must be topped once or

FIG. 1.

twice; in short, as soon as it has grown ten inches, pinch off its top, and if it break into two or three shoots, pinch them all but the leader, as directed for the first season: in a few years most symmetrical trees may be formed.

When they have attained the height of six or

eight feet, and are still in a vigorous state, it will be necessary to commence root-pruning, to bring them into a fruitful state.

If some of the buds in the stem of a young tree prove dormant, so that part of it is bare and without a shoot where there should be one, a notch, half-an-inch wide and nearly the same in depth, should be cut in the stem just *above* the dormant bud. If this be done in February a young shoot will break out in the summer.[1]

I have thus far given directions for those who are inclined to rear their own pyramids. Time and attention are required, but the interest attached to well-trained pyramids will amply repay the young cultivator.

THE MATURE PYRAMID.

The annexed figure (Fig. 2) is a pyramidal tree in its second and third year, and such as it ought to be in July, before its leading side shoots and leading upright shoot are shortened. This, as I have said, is best done towards the end of August. The shortening must be made at the marks —; all the side shoots must be shortened in this manner, and the leading shoot; no further pruning will be required till the following summer. The spurs *a*, *a*, *a*, are the bases of the shoots that have been pinched in June; these will the following season form fruit-bearing spurs. The best implement for summer and autumnal pruning is a pair of hooked pruning scissors, called also "rose nippers."

(1) Bare places in the stems of pyramids, and in the branches of espaliers or wall trees, may be budded towards the end of August with blossom-buds taken from shoots two years old. This is a very interesting mode of furnishing a tree with fruit-bearing buds.

Fig. 2.

SUMMER PINCHING.

As the summer pinching of pyramidal pears is the most interesting feature in their culture, and perhaps the most agreeable of all horticultural occupations, I must endeavour to give plain instructions to carry it out.

The first season after the planting, about the middle or end of June, the side buds and branches will put forth young shoots; each will give from one to three or four. Select that which is most horizontal in its growth (it should be on the lower part of the branch, as the tree will then be more inclined to spread) for a leader to that branch, and pinch off all the others to three leaves (see Fig. 2, *a*, *a*, *a*). If these pinched shoots again push, suffer them to make two or three leaves, and then pinch them to one leaf; but if the horizontal branch has a good leader. it will take off all the superfluous sap, and prevent the pinched spurs from breaking; their buds will only swell, and the following season they will be fruit spurs. The upper part of the tree, say to about two feet from its top, should be pinched a week before the lower part: this gives strength to the lower shoots.

Fig. 3 is a side branch in June, with its shoots not yet pinched; Fig 4 is a side branch, with its shoots *a*, *a*, pinched in June; *b* is the leader of the side branch, which should be pinched or cut off at the end of August to *c*.

In spring the perpendicular leader of the preceding year's growth will put forth numerous shoots, which must be pinched in June in the following manner: those nearest the base, leave *six inches in* length, gradually decreasing up-

wards, leaving those next the young leading shoot only two inches long. The leader of these ready-formed pyramids need not be shortened in summer, as directed for younger trees; it may

Fig. 3.

Fig. 4.

be suffered to grow till the horizontal leaders are shortened in August, and then left six or eight inches in length; but if the trees are to be kept to six or seven feet in height under root-pruning,

this leading shoot may be shortened to two inches, or even cut close down to its base. For tall pyramids of ten, twelve, or fifteen feet, it may be left from eight to ten inches in length till the required height be attained; it may then be cut to within two inches of its base every season.

I ought here to remark that pear trees differ in their habits to an extraordinary degree: some make shoots most robust and vigorous; others, under precisely the same treatment, are very delicate and slender. In the final shortening in August this must be attended to; those that are very vigorous must not have their shoots pruned so closely as those that are less so: indeed, almost every variety will require some little modification in pruning, of which experience is by far the best teacher. It will, I think, suffice, if I give the following directions for shortening the leaders of the side shoots, and the perpendicular leaders:— All those that are very robust, such as Beurré d'Amanlis, Vicar of Winkfield, Beurré Diel, &c., shorten to eight or ten inches, according to the vigour of the individual tree; those of medium vigour such as Louise Bonne of Jersey, Marie Louise, and Beurré d'Aremberg, to six inches; those that are delicate and slender in their growth, like Winter Nelis, to four inches: but I must repeat that regard must be had to the vigour of the tree. If the soil be rich, the trees vigorous, and not root-pruned, the shoots may be left the maximum length; if, on the contrary, they be root-pruned, and not inclined to vigorous growth, they must be pruned more closely.

If pyramidal fruit trees, either of pears, apples, plums, or cherries, are annually or biennially

removed, or even thoroughly root-pruned without actually removing them, summer pinching becomes the most simple of all operations. The cultivator has only to look over his trees twice a week during June, July, and August (penknife in hand), and cut or pinch in every shoot that has made four leaves or more, down to three. It is just possible that the three buds belonging to these three leaves will put forth three young shoots: as soon as they have made their four or five leaves, they must also be shortened to three, and so on with *every young shoot* made during the summer.

ROOT-PRUNING OF PYRAMIDAL PEAR TREES ON QUINCE STOCKS.

Before entering on the subject of root-pruning of pear trees on quince stocks, I must premise that handsome and fertile pyramids, more particularly of some free-bearing varieties, may be reared without this annual, or biennial, operation. I have a large plantation of pear trees on the quince stock, which have made very handsome and fertile pyramids, yet they have not been root-pruned, neither do I intend to root-prune them. But I wish to impress upon my readers that my principal object is to make trees fit for small gardens, and to instruct those who are not blessed with a large garden how to keep their trees perfectly under control: and this can best be done by *annual*, or at least biennial, attention to their roots; for if a tree be suffered to grow three or more years, and then be root-pruned, it will receive a check if the spring be dry, and the crop of fruit for one season will be jeopardised. Therefore, those who are disinclined to the annual operation,

and yet wish to confine the growth of their trees within limited bounds by root-pruning—say once in two years—should only operate upon half of their trees one season; they will thus have the remaining half in an unchecked bearing state; and those who have ample room and space, may pinch their pyramids in summer, and suffer them to grow to a height of fifteen or twenty feet without pruning their roots. I have seen avenues of such trees in Belgium really quite imposing.

The following summary will perhaps convey my ideas respecting the management of pyramids and bushes when cultivated as garden trees. In small gardens with rich soils, root-prune or remove all the trees annually early in November. In larger gardens, perform the same operation biennially at the same season. For very large gardens with a dry, good subsoil, in which all kinds of fruit trees grow without any tendency to canker, and when large trees are desired, neither remove nor root-prune, but pinch the shoots in summer, thin them in winter when they become crowded, and thus make your trees symmetrical and fruitful.

Pyramidal pear trees on the quince stock, *where the fruit garden is small*, and the real gardening artist feels pleasure in keeping them in a healthy and fruitful state by perfect control over the roots, should be annually operated upon as follows:—A trench should be dug round the tree, about eighteen inches from its stem, every autumn, just after the fruit is gathered, if the soil be sufficiently moist,—if not, it will be better to wait till the usual autumnal rains have fallen;—the roots should then be carefully examined, and those in*clined to perpen*dicular growth cut with the spade,

which must be introduced quite under the tree to meet on all sides, so that no root can possibly escape amputation. All the horizontal roots should be shortened with a knife to within a circle of eighteen inches from the stem,[1] and all brought as near to the surface as possible, filling in the trench with compost for the roots to rest on. The trench may then be filled with the compost (well-rotted dung and the mould from an old hotbed, equal parts, will answer exceedingly well); the surface should then be covered with some half-rotted dung and the roots left till the following autumn brings its annual care. It may be found that after a few years of root-pruning, the circumferential mass of fibres will have become too much crowded with small roots; in such cases, thin out some of the roots, shortening them at nine inches or one foot from the stem. This will cause them to give out fibres, so that the entire circle of three feet or more round the tree will be full of fibrous roots near the surface, waiting with open mouths for the nourishment anually given to them by surface dressings and liquid manure.

Thus far for the gardener who does not mind extra trouble,—who, in short feels real pleasure in every operation that tends to make his trees perfect in fruitfulness and symmetry. But it is not every amateur gardener that can do this, nor is it always required in the south of England, except for small gardens and in rich moist soils, in which pear trees are inclined to grow too vigorously. But with our too often cool moist

(1) If they have not spread to this extent the first season, or even the second, they need not be pruned, but merely brought near to the surface and spread out.

summers in the northern counties, annual root-pruning is quite necessary to make the trees produce well-ripened wood. In other cases, as I have before observed, shortening the shoots in summer, taking care to produce a handsome pyramidal form, and if they are inclined to grow vigorously, biennial root-pruning will be quite sufficient.

The following will be found a good selection of varieties for pyramidal trees on quince stocks. They may be planted in rows, five to six feet apart, or a square may be allotted to them, giving each plant five to six feet, which will be found amply sufficient for root-pruned trees. Some few esteemed sorts of pears do not grow well on quince stocks, unless "double-worked"—*i. e.*, some free-growing sort is budded on the quince, and after having been suffered to grow for one or two seasons, the sort not so free-growing is budded on it. For ten varieties, placed in the order of their ripening, the undermentioned may with safety be recommended.[1] (In the following lists, varieties marked thus* may be chosen by those who require only a few trees.)[2]

1. Doyenné d'Eté*	July
2. Beurré Giffard	August
3. Bon Chrétien (Williams')*	September
4. Beurré Superfin*	October
5. Fondante d'Automne	October
6. Louise Bonne of Jersey*	*m. & e.* October
7. Alexandre Lambré	Nov. and Dec.
8. Beurré d'Aremberg*	December
9. Josephine de Malines*	March
10. Bergamotte d'Esperen* (3)	April and May

(1) All the varieties recommended for pyramids may also be planted as espaliers to train to rails in the usual mode.

(2) A very good light permanent label for pyramidal and other fruit trees, is a small piece of zinc, painted with white-lead paint, and written on while moist with a strong black-lead pencil. It should be suspended from a side branch of the tree (not the stem) by a piece of stout copper wire.

(3) This is a most abundant bearer. A pyramid in the garden of Thomas White, Esq., which was root-pruned in the autumn of 1858, bore two bushels in 1859.

For twenty add—

11.	Tyson	August
12.	Colmar d'Eté	September
13.	Baronne de Mello *	October
14.	Beurré Hardy *	October
15.	Doyenné Gris	*c.* October
16.	Conseiller de la Cour	*b.* November
17.	Winter Nelis *	December
18.	Beurré d'Anjou	*c.* December
19.	Beurré Sterckmans	January
20.	Prince Albert	March

The above succeed on the quince, and form excellent pyramids.

ORNAMENTAL PYRAMIDAL PEAR TREES ON QUINCE STOCKS.

There are some few varieties of pears, the trees of which may be made highly ornamental even on a well-dressed lawn, as they grow freely and form naturally beautiful cypress-like trees, at the same time their fruit is of first-rate quality. Such are Baronne de Mello, Duchesse d'Angoulême, Urbaniste, Alexandre Lambré, Beurré Hardy, White Doyenné, Grey Doyenné, Louise Bonne of Jersey, Passe Colmar, Zéphirin Grégoire, Beurré Léon le Clerc, Délices d'Hardenpont, Prince Albert, Délices de Jodoigne, Doyenne de Comice, Alexandrina, Bergamotte d'Esperen, Susette de Bavay, and some others.

PEAR TREES AS BUSHES ON THE QUINCE STOCK.

It is only very recently that this mode of cultivating pear trees has struck me as being eligible, from having observed the fruit of some of the large heavy varieties, such as Beurré Diel and Beurré d'Amanlis, so liable to be blown off pyramids by even moderate autumnal gales. The trees also of these and several other fine sorts of pears are difficult to train in the pyramidal form,

for the soil in them is generally rich. These bush trees offer two very great advantages,—they are protected from spring frosts when in blossom, and they may be planted from four to five feet apart, so as to be eligible for very small gardens with great facility.

In large gardens in situations exposed to the wind, large bushes may be desirable. In such cases the leading shoots may be pinched, as recommended for pyramids (page 8); but instead of pinching them to three leaves, they may be suffered to make ten leaves and then be pinched, leaving seven. The trees will, if treated in this manner, soon become large, compact, and fruitful.

The following varieties are well adapted for bush culture, as they are spreading in their growth and difficult to form into compact pyramids, although they may be made into spreading and prolific conical trees. It ought, however, to be mentioned that those sorts, such as Louise Bonne of Jersey, which form handsome pyramids, make very pretty compact bushes by cutting out the central branch to within three feet of the ground; so that pyramids may be easily formed into bushes. I may add that these bush pears produce the very finest fruit, from their being so near the heat and moisture-giving surface of the earth.

In situations near the seacoast exposed to "sea breezes," small fruit gardens may be formed by enclosing a square piece of ground with a beech hedge or wooden fence, and planting it with bush trees. A piece of ground of 500 square feet will be large enough to cultivate 30 trees at 4 feet apart in it, or 25 trees at 5 feet apart. Many a sea-side cottage may thus have its fruit garden.

LIST OF PEARS ADAPTED FOR BUSH CULTURE.

Alexandre Bivort	January
Joséphine de Malines	March
Beurré Bosc	October
Winter Nelis	December
Beurré d'Amanlis	September
Beurré de Rance	March
Beurré Diel	December
Beurré Giffart	August
Beurré Goubault	September
Citron des Carmes	July
Doyenné Bousseoch	October
Jargonelle	August
Conseiller de la Cour	November
Dr. Trousseau	December
Zéphirin Grégoire	January
Triomphe de Jodoigne	December
Nouveau Poiteau	November
Jalousie de Fontenay	August
Catillac (for baking)	December
Léon le Clerc de Laval (for baking)	May

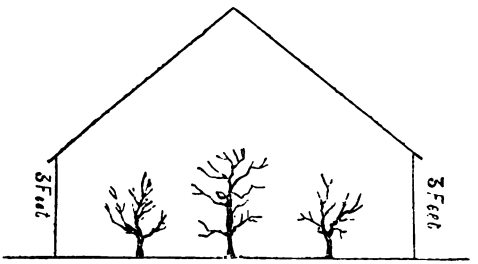
PROTECTORS FOR PYRAMIDAL AND BUSH PEAR TREES.

The weather in spring is often cold and ungenial for the blossoms of pear and other fruit trees; in such seasons pyramids should be protected. This is best done by fixing four stout stakes round a tree; these should be a little taller than the tree, and then be sawn off level. A square piece of calico, or any cheap canvas, should then be nailed on the top of the stakes to form the roof, the like material brought round the sides and fastened to the stakes by small nails or tacks, from within eighteen inches of the ground to within eight inches of the top, thus leaving a space between the top and side covering for free ventilation, as the air when heated by the sun will rush out of the aperture at top in a continual stream. These flat-roofed square tents will generally insure a crop of fruit.

Pea-sticks—*i.e.*, stakes with the small brush-wood on them—stuck round each tree, and spruce or other fir branches, where these can be procured, are also good protectors. For bush trees hay is a capital protector, particularly from those still near

frosts which are generally so destructive; it should be strewed lightly over them when they are just commencing to blossom. If some brushwood sticks are placed round the bush so as to lean over it, the hay will adhere so the spray, and remain undisturbed by the wind. Tiffany may be used to throw over pear bushes; it is so light that it does no injury to the tender blossoms; it should be taken off on sunny days. There is, perhaps, no better protector than old or new netting; if woollen, all the better. This should be thrown over the trees two or three times thick, and suffered to remain on till the fruit is safe from frosts,—*i.e.*, till the end of May.

THE TIFFANY-HOUSE PROTECTOR.



Section of Tiffany-house.

Houses built with stakes or slight timber, and the roofs and sides covered with tiffany, have very recently been introduced and found efficient in protecting half-hardy plants from severe frost.

I now propose to erect temporary houses of the same materials to protect dwarf and pyramidal fruit trees while they are in bloom, and I have no doubt but that they will lead to a new era in fruit gardening among amateurs, offering, as they do, a

very cheap method of protection. A border or bed of fruit trees may be eight feet wide and planted with three rows of bush fruit trees, as shown in the above section, one row in the centre, and the other rows three feet from it, and the trees three feet apart in the rows, thus occupying six feet of the bed.

A tiffany-house to cover the trees in a bed of the above width may be eight feet wide, three feet high at the sides, and five feet high in the centre.

The roof of tiffany should be fastened to the rafters with shreds three or four times double, so as to make a thick pad, and either nailed on with short nails or fastened with screws, so that it may be easily taken to pieces annually the first week in June, for till then we are not safe from spring frosts. The tiffany-house should be placed over the trees the first week in March, unless the season be unusually early, when the middle of February would be better. The sides should be loose, and be turned up night and day in mild weather while the trees are in bloom; but in cold, sharp, windy weather in the blossoming season they should be kept down, and fastened to the upright stakes by tying or otherwise.

A tiffany-house twenty-four feet long and eight feet wide will thus shelter twenty-four trees, either bushes or pyramids; if for the latter, the sides of the house should be four feet, and its centre seven to eight feet in height. If it be thought desirable to keep the trees in a comparatively small space, they may be removed biennially in October. If larger trees are desired, the house may be enlarged as the trees grow. A tiffany-house may be from one to 500 feet in length, and twenty in width if desirable, for there are no particular limits to its extent, only the effects of a "March wind" must

be thought about when lofty and extensive houses are put up. As measures of economy the timber and tiffany should be placed in a dry place when removed, and the rafters fastened to the plate and ridge board with screws. A tiffany-house thus treated—"kindly and gently"—will last for several years; and in places where the climate is sufficiently warm to ripen apricots, plums, pears, cherries, and even early peaches, in the open air, they will, I have no doubt, be extensively employed.

PEAR TREES ON THE QUINCE STOCK, TRAINED AS UPRIGHT ESPALIERS AND PYRAMIDS FOR WALLS.

In gardening, as well as in many other matters connected with active life, how much we owe to necessity! In April, 1849, I much wished to plant one of each of some new and esteemed pears on quince stocks against a boarded fence, so that they would quickly come into bearing. The usual method of horizontal training I found would take up too much space, and I could not find room for half the number of trees I wished to plant. In this strait, an old idea came to my assistance—that of cutting pyramidal trees flat, and planting them against walls; and then a modification of the idea came to hand—viz., to plant horizontal espaliers, and to make them perpendicular. In next page is the figure of one of my trees in full vigour. (Fig. 6.)

The shoots *a*, *a*, should be eight inches from the central shoot, and those marked *b*, *b*, the same distance from those marked *a*, *a*. This tree, with five branches, will thus occupy thirty-two inches —say three feet of wall room; a tree with seven *branches* will require four feet, but, as some space

ought to be allowed for the spurs on the outside branches, say five feet. If the wall be of a moderate height—eight feet, for instance—a tree with seven branches will produce quite enough fruit of one sort. This method offers a strong contrast to espaliers on pear stocks, planted in the

Fig. 6.

usual manner, twenty-four feet apart, and trained horizontally; nearly five trees for one will give so many additional chances to the pear cultivator: the single tree may fail, or its fruit may become imperfect, owing to an adverse season; but out of his five trees, he will, in every season stand a good

chance of having *some* good pears. A few words will suffice for their management: summer pinching of the shoots, as recommended for pyramids (page 8), and root-pruning, or biennial removal—like Dr. Sangrado's bleeding and warm water—will do all.

If upright trained trees on the quince stock cannot be procured, those that are trained horizontally, with five or seven branches, may be planted against the wall or fence destined for them; and their young shoots, *a*, *a*, and *b*, *b*, in Fig. 6, be made to curve gently till they are perpendicular,—the young shoots of pear trees are very pliable, and will easily bend to the required shape. The lower part of each shoot in such cases must be fastened to the wall with shreds and nails, in the usual way, and the remaining part brought round to an upright position. Each of these shoots must then be shortened, leaving them from ten inches to one foot in length; the leading shoot must be shortened to the same length. These shortened branches will, in May, each put forth two or three shoots. As soon as they have made four leaves, pinch all but one on each branch to three leaves, leaving the topmost one to each shoot, *a*, *a*, and *b*, *b*, as above, also to the leader. You will thus, if your tree be five-branched, have five young leading shoots. As soon in June as they have attained to eight inches in length, pinch off the end of each; and when they break into two or three shoots as before, pinch so as to leave the spurs with three leaves, all but one to each branch. This may be repeated, if the soil be rich, two, three, or four times in the summer. Your tree will soon reach the top of the wall, and every bud in the

five branches will be perfect—either a blossom-bud, or one in embryo. When every branch has reached the top of the wall, commence root-pruning (or biennially lifting them) in autumn; the directions for which are given in treating of pyramidal trees. These may be followed exactly; and if so, the trees will be kept in a stationary bearing state.

I may as well hint to the reader that, if larger trees are wished for, so as to give more fruit of each sort, trees with nine upright branches may be planted seven feet apart, or trees with eleven upright branches, nine feet apart. Trees, however, can seldom be purchased with shoots so numerous; young trees must, therefore, be planted, and cut back annually for two or three years, till the proper number of perpendicular shoots are supplied. It may happen that trained trees with five or seven branches cannot be procured, perhaps trees with only three shoots, two horizontal and one leading shoot; in such cases they must be cut back, leaving five buds to each shoot, and the young shoots in June trained as required.

Pyramidal trees cut flat on the side to be placed next the wall, and planted against walls or fences, will give almost a certain crop. Their shoots must be pinched, and trained so as to form a handsome semi-pyramidal tree, which, when it has reached the top of the wall, must be subjected to biennial removal, so as to keep it in a stationary fruitful state. Annexed I give a figure (Fig. 7) of a young pyramid planted against a south-east fence.

It will, I trust, be seen how economical of space are these methods of training pears to walls; and I know of nothing in fruit culture more interesting than a wall of upright espaliers or of pyramids

full of fruit. Let us only consider that a wall one hundred feet long will accommodate *four* trees on the pear stock, trained in the usual horizontal mode; the same wall will give "ample room and verge enough" to *twenty* trees on the quince stock, trained perpendicularly, and root-pruned. They are also invaluable for planting against walls between old trees where there are bare spaces, as is so often the case; for they soon fill up such vacancies, and bear abundance of fine fruit. A selection of varieties for wall trees will not here be out of place.

FIG. 7.

UPRIGHT TRAINED TREES ON QUINCE STOCKS.

FOR SOUTH OR SOUTH-WEST WALLS.

Crassane *	Glou Morceau *
Summer Doyenné (1)	Brown Beurré
Chaumontel	Van Mons (Léon le Clerc)
Passe Colmar	Gansel's Bergamot (2)

FOR WEST OR NORTH-WEST WALLS.

Beurré Diel *	Beurré Superfin *
Beurré d'Amanlis	Marie Louise *
Beurré de Rance	Louise Bonne of Jersey
Beurré Sterckmans *	Joséphine de Malines *

FOR EAST OR SOUTH-EAST WALLS.

Beurré, Easter *	Doyenné d'Hiver nouveau
Beurré d'Aremberg *	Prince Albert
Bergamotte d'Esperen *	Conseiller de la Cour
Winter Nelis *	Beurré d'Anjou *

The above varieties grafted on pear stocks are equally adapted for their several aspects. In shallow gravelly or chalky soils, pears on pear stocks are to be preferred for walls.

It is almost useless to plant dessert pears against north or north-east walls, as the fruit, unless in very warm seasons, is generally deficient in flavour. The only varieties that offer the least chance of success, and that only in a warm climate with a dry soil, are Marie Louise, Louise Bonne of Jersey, and Beurré Superfin. It is far better to plant against such aspects baking or stewing pears, such as Catillac, Bellissime d'Hiver, Passe Tardive, and Léon le Clerc de Laval; the Vicar of Winkfield is also a good north wall pear—it bears well and stews well.

(1) This will ripen on walls towards the end of June, quickly followed by Citron des Carmes.

(2) It is not generally known that this fine variety, proverbially a shy bearer, becomes, when double worked on the quince stock, one of the most abundant bearers (see page 89).

In the extreme north the finer sorts of pears can only be had from south walls. In recommending pears on quince stocks as pyramidal trees for cold soils and situations, even in the far north, I may appear theoretical; but from my own experience in some very cold and clayey soils in this neighbourhood, I feel sanguine as to the result, for I have observed in my frequent visits to the pear gardens of France that many sorts are often *too ripe*. Now, this is just the tendency we require. In our cold and moist climate, most certainly, pears will not get *too ripe*, more especially in the north of England and Scotland. Some years since I received a letter from a correspondent living in a hilly part of Derbyshire from which I give an extract:—"I have tried Beurré Diel, Beurré de Capiaumont, Marie Louise, and Williams' Bon Chrétien, on pear stocks, all of which bear well as standards, but their fruit does not come to perfection—always remaining quite hard till they decay at the core. I have placed the fruit in a hothouse, but have never succeeded in ripening them. Williams' Bon Chrétien we can only use for stewing." This seems to show that cold hilly situations are not favourable to the cultivation of pears as standards. I have recommended some pears on quince stocks, and have heard of a favourable result.

UPRIGHT ESPALIER PEARS ON TRELLISES UNDER GLASS.

Some few years since a very ingenious method of growing peaches and nectarines on trellises, over which were placed moveable glass lights

was invented by Mr. Bellenden Ker. In warm and sheltered gardens this mode of culture answers very well for peaches, but in cool climates there is not day-heat enough stored up, as in houses, to act upon the fruit. Cheap orchard-houses are, therefore, to be preferred to these cheap trellises for the above kinds of fruits, unless the garden be small and much sheltered.

Soon after I had built my trellis for peaches, it occurred to me that the system applied to pear culture would do well, and so I built a trellis 60 feet long and 7 feet wide; on this I planted upright espalier pears on quince stocks. Fig. 8

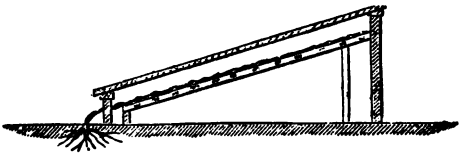


Fig. 8.

is a section of this trellis, and Fig. 9 is a front view of a pear tree trained to it in the upright method. My trellis was planted eight years ago,

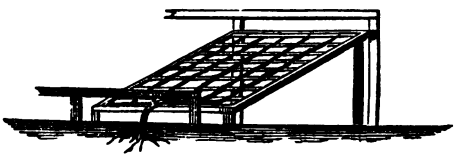


Fig. 9.

and has now on it twenty fine trees, about ten years old, and in full bearing. They were

planted three feet apart, as it was my first experiment, and are now a little crowded; four feet apart will be found the proper distance. I have never seen anything more interesting in fruit culture than this trellis covered with pears, for owing to its being near the ground, the radiation of heat and moisture gives the fruit a size and beauty rarely seen even on walls.

The lights should remain over the trees till the beginning of July, and then be removed, suffering the fruit to ripen fully exposed to the sun and air. It seems that the glass over the fruit in its young state serves to develop its growth in a remarkable manner, for rarely is a spot seen on pears grown on these trellises; they have a clear, beautiful appearance, much like those grown in the warmer parts of France. I ought to add, that in cool climates, such as the north of England and Scotland, the lights may be suffered to remain over the trees till the beginning or middle of August. This will hasten the ripening of the fruit, but it should be exposed to the air in early autumn for some weeks before it is gathered (unless the climate be particularly cold and stormy), or it may suffer in flavour. Pears ripened under glass are apt to suffer in this respect. I have, however, very recently received the following communication from a very clever fruit-cultivator living in Ireland:—

"Let no one persuade you that pears grown in a well-ventilated orchard-house are not equal to those outside; I can give strong evidence to the contrary. In my house there was a small Louise Bonne on the quince stock, in an 11-inch pot; it bore 23 splendid pears, as far superior to the same

fruit grown in the open air, as it was possible to be. They were not, I admit, high-coloured, but they attained a richness and flavour that I thought Louise Bonne did not possess."

The pear trellis, of which the section and front view given in page 29 will give a correct idea, is of the most simple description. A row of larch or oak posts must be driven into the ground, 6 feet apart, and another row in front; on these should be nailed plates, 3 inches by 2, and then bars, 3 inches by 1, placed flatwise, from front plates to back, 3 feet apart; across these, common tiling laths should be nailed, 6 inches asunder. This will form the trellis, as seen in Fig. 9. The supports for the lights are formed in the same manner, by a row of posts at the back, and the same for the front, on which are nailed plates of the same dimensions as those for the trellis; a cross-piece should be nailed to front and back plate at each end, to keep the supports for the lights from giving way. The structure with the lights, when resting on the back and front plates, has exactly the appearance of a large garden frame without back, front or ends. Under the lights the trellis is formed with a sharp slope upwards to the back; for unless the front of the trellis is within six inches of the ground, it will be difficult to bend the trees to the required position. By this simple contrivance, pears (and even peaches and nectarines, in warm gardens,) may be grown in any corner of the garden, with a south or south-western exposure,—for it is scarcely necessary to add that the lights should slope to the south or south-west, so as to have all the sun-heat possible.

The most eligible dimensions for a trellis, I find from experience to be as follows:—

Glass Lights.

Eight feet long, three feet wide.
Height from ground at back, three feet six inches.
Height from ground at front, one foot six inches.

Trellis.

Height from ground at back, two feet six inches.
Height from ground at front, six inches.
Distance from glass lights, one foot.

The front border should be raised to a level with the front of trellis; this will leave twelve inches between the front ends of the lights and the surface of the front border, which will be quite enough for ventilation; indeed, the draught in windy weather is inclined to be too sharp. I find, therefore, furze, or other evergreen branches, placed along the front, between the glass and the border, and a mat nailed at the back, excellent checks to excessive ventilation in cold frosty weather. They may remain there till the beginning or end of June; the latter, if the weather be cold and stormy. The lights are fastened to the plate, back and front, by a hook-and-eye; they are thus easily removed to prune the trees and gather the fruit.

I was induced, as I thought, to improve upon Mr. Ker's plan, by having my first trellis within eight inches of the glass,—for I calculated, the nearer the glass the better the chance of success in early ripening; but I suffered for my innovation. My peach trees were planted in March, 1848; they made during the summer, with the lights constantly on, beautifully matured shoots, and in March and April, 1850, were gay with blossom.

The winds were cold, the nights frosty; but owing to the extreme ventilation, which kept every bud and shoot dry under the glass, not a blossom was injured by the sharp winds, and the trees were covered with fruit. On the fatal third of May, however, in 1850, a still hoar frost—the thermometer down to 23°—destroyed all my hopes, for, owing to the trees being too near the glass, every fruit was blackened and destroyed—a single mat would have saved them; but I was not at home, and my pet trees were forgotten. Do not, therefore have the trellis nearer the glass than twelve inches.

It will be seen that I employ smaller lights, which are easily removeable for purposes of culture, and a smaller trellis than that described by Mr. Ker in the seventh edition of this work. I find from experience this smaller edition of the Kerian trellis much to be recommended for small gardens.

THE CULTURE OF PEARS ON DWARF WALLS.

Having had occasion within these two years to erect a large number of four-inch brick walls on which to train young peach trees, I have been much struck with their eligibility for pear trees on quince stocks. A very large number of trees may be cultivated in this manner on a small piece of ground.

My walls have nine-inch foundation of three courses of brickwork in the ground, and they are carried up to four feet above the surface (it is scarcely safe to build them of a greater height), with nine-inch piers fifteen feet apart. The coping for them is made of boiling coal-tar

mixed with lime and sand to the consistence of mortar, which is placed on the top of the walls thus ⌓ so as to carry off the water. This is a most cheap and efficacious covering—it can scarcely be called a coping, as it does not project over the edge of the wall. A coping of Portland cement is even better, as it holds the wall together.

The best description of bricks for these light walls are the patent perforated bricks, but common stock bricks will do. The very best lime should be used (I have found the grey Dorking lime excellent), but any kind of lime made from limestone will answer well; that made from chalk in this county is not strong enough. Their cost, as I learn from my bricklayer, is about six shillings the yard in length; thus, a wall of the above height, twenty yards long, should cost six pounds. In places where bricks are cheap they may be built for less; if they are dear, and at a distance, their carriage will add to the expense. My walls are six feet apart, and stand endwise, N.E. and S.W.; so that one side of each wall has a S.E. aspect, the other a N.W.; on the former may be grown the late-keeping pears, on the latter the earlier sorts, that ripen from October till the end of November. We thus have one excellent aspect—the S.E.; and one tolerably good—the N.W.: so that no wall space is lost.

The pear trees for these dwarf walls should be grafted on quince stocks, and trained horizontally. They may be planted five feet apart at first, and when their branches meet they should be interlaced, as in Fig. 10, and if necessary—*i. e.*, if the shoots be long enough—they may be

trained over the stems, so that the wall is completely furnished with bearing branches. At the end of five or six years every alternate tree may be removed, leaving the permanent trees ten feet

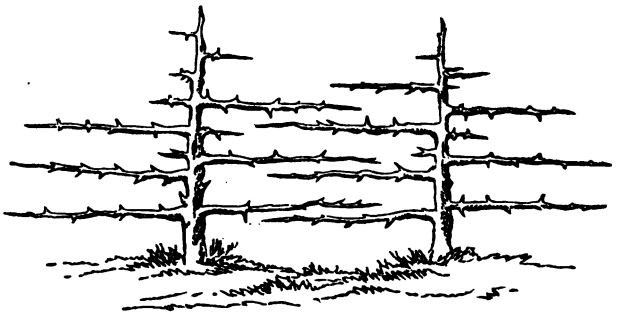


Fig. 10.

apart. I advise planting thus thickly, because I know from experience, that the temporary trees will fill the walls, will bear a good quantity of fruit, and look more satisfactory than if they are planted thinly. When removed they may be planted out for espaliers, or fresh walls built for them. I have some trees that have been planted six years; but I find that, owing to the soil not being rich, they have not grown rapidly, and need not yet be removed, as their branches only just cover all the fence to which they are trained.

If, owing to the soil being rich, the trees are inclined to grow vigorously and not bear, they should be lifted biennially; but pears on quince stocks will be sure to bear abundantly.

These dwarf walls, when covered with well-

trained trees, have a neat and charming effect; and the trees may be so easily protected, by sticking branches of evergreens in the ground and letting them rest against the wall, or by wooden shutters, placed on the ground at an angle so as to rest against the wall;—but I intend to be more luxurious, and to have cheap glass lights, in lieu of shutters, placed against the walls, and suffered to remain, so as to cover the trees till the fruit is fully formed, or till the first week in June, when all fear of damage from frost is over.

Where two or more walls are built, or a square piece of ground devoted to them, a cross wall or walls should be built at the north-east end, to prevent the sharp current of wind from the north-east, which would blow up the intervals between the walls with great violence. It is surprising what a quantity of fruit may be grown on a small space of ground with the aid of these walls! Peaches, nectarines, and apricots may be grown on the S.E. aspect, but the trees must be kept in check by biennial removal. I have at this moment more than two thousand yards in length of them, and I intend to add to them annually, so convinced am I of their economy and utility. They seem to me most particularly suited to suburban, or what are commonly called cockney gardens. How pleasant to be able to have a brick wall twenty yards long for six pounds, or ten yards long for three pounds! and how delightful to be able to grow one's own "wall fruit!" On a wall ten yards long five peach and nectarine trees may be trained, and many dozens of fruit produced annually. *These* dwarf walls for the cultivation

of peaches, nectarines, and apricots must, however, be built so as to give a south or south-west aspect for the front, a north or north-east for the back. The latter may be planted with Morello cherries. To carry out the cultivation of the above mentioned trees on dwarf walls, it is absolutely necessary to take them up biennially in November, and replant them in the same place. They will not require any compost to their roots, for peach, nectarine, and apricot trees are generally by far too vigorous in their growth. In some of the London suburban gardens the soil is so rich, that annual removal, *particularly with apricots*, may be found to be quite necessary. In country gardens where the soil is poor, a dressing of manure on the surface over the roots two inches deep will be of service. The peach trees on my experimental wall are removed biennially. The soil is not rich, yet they are almost too vigorous; they bear fine fruit and give good crops.

ESPALIER PEARS ON QUINCE STOCKS.

Pears on the quince may also be cultivated as horizontal espaliers by the sides of walks, or trained to walls with much advantage, as less space is required. Horizontal espaliers, or wall trees, on the pear stock, trained to walls of the usual height—*i. e.*, from ten to twelve feet—require to be planted twenty feet apart, while those on the quince may be planted only ten feet apart; this in a small garden will allow of much greater variety of sorts to supply the table at different seasons. With these the same high culture, if perfection be wished for, must be followed; the trees carefully planted, so that

the junction of the graft with the stock is even with the surface of the mound formed as directed for pyramids. The pruning of wall pear trees has always been a subject of controversy with gardeners, as they are inclined to grow too vigorously. If it be thought desirable to have trees of large growth, so as to cover a high wall, and yet be highly fertile, it is much better to root-prune than to prune the branches. With such trees it need not be done so severely: biennial root-pruning will be quite sufficient, commencing at eighteen inches from the wall, after the tree has had two seasons' growth, cutting off the ends of all the roots at that distance from the wall, and increasing it by six inches at every biennial pruning, till a distance of six feet from the wall is reached. When this is the case the roots must be confined to the border of that width by digging a trench biennially, and cutting off all the ends of the roots at that distance from the wall.

I may, perhaps, make this more plain by saying that a tree planted in November, 1860, should have its roots shortened to eighteen inches in November, 1862; to twenty-four inches in 1864; to thirty inches in 1866; to three feet in 1868; and so on, leaving six inches biennially till say a distance of six feet from the wall is reached in 1880. This border, six feet wide,[1] will then be full of fibrous roots. It should never be dug or cropped, but annually have a surface dressing of manure about two inches in thickness; and, as I have before said, have a trench dug

(1) If the wall to which the trees are trained be twelve feet and upwards in height, the border should be eight and even ten feet in width. Wide and shallow fruit tree borders are much to be preferred to those that are *deep and narrow.*

biennially eighteen inches deep, six feet from the wall, and the end of every protruding root cut off. If this method be followed, summer pinching to three leaves the first time, and to one leaf afterwards (see page 8), of all the best leading shoots, may be practised, and scarcely any winter pruning will be required.

In forming borders for wall pear trees on quince stocks biennially root-pruned, the soil should be well stirred with the fork to a depth of eighteen inches, and if it be poor a good dressing of rotten manure or leaf mould should be mixed with it. Pears on quince stocks are much better adapted for this mode of culture than those on pear stocks. If the latter be planted, the border, six feet wide, should have a thick layer of concrete at bottom, to prevent the roots striking downwards; or it would be good practice to place, eighteen inches deep, under each tree, a flat piece of stone, three feet in diameter—this would force the roots to take a horizontal direction, and facilitate the operation of root-pruning.

For fine specimens of wall pear trees grafted on the quince, I may refer to those on the west wall of the Royal Horticultural Society's Gardens at Chiswick. These are now about forty years old, and are pictures of health and fertility, thus at once settling the question respecting the early decay of pear trees grafted on the quince; for it has been often—very often—urged as an objection to the use of the quince stock, that pears grafted on it are, although prolific, but very short-lived. I have seen trees in France more than fifty years old, and those above referred to may be adduced to confute this error.

PYRAMIDS ON THE PEAR STOCK.

There are some dry, warm, shallow soils, more particularly those resting on chalk or gravel, which are unfavourable to the pear on the quince stock: it is difficult to make them flourish, unless great care is taken in mulching the surface, and giving them abundance of water and liquid manure in summer. In such soils pyramids on the pear stock may be cultivated with but little trouble.

To those who wish to train them as they should grow, one-year-old grafted plants may be selected, which may be managed as directed for young pyramids on the quince stock. If trees of mature growth are planted, they will require the treatment recommended for pyramids on the quince stock, as regards summer pinching. There is no occasion, however, to make a mound up to the junction of the graft with the stock, as the pear does not readily emit roots. *Annual* root-pruning is almost indispensable to pyramids on pear stocks in *small* gardens, and it will much facilitate this operation if each tree be planted on a small mound, the roots are then so easily brought to the surface. This annual operation, which should be done in November, may be dispensed with in soils not rich, if the trees be lifted biennially in that month and replanted, merely pruning off the ends of any long roots. Annual surface manuring, as recommended for pyramids on the quince, is also necessary, if the trees be root-pruned or biennially removed.

Trees of the usual size and quality may be planted, and suffered to remain for two years undisturbed, unless the soil be rich and they make

vigorous roots the first season after planting, in which case operations may then commence the first season. Thus, supposing a tree to be planted in November or December, it may remain untouched two years from that period; and then as early in autumn as possible a circumferential trench, twelve inches from the stem of the tree and eighteen inches deep, should be dug, and every root cut with the knife and brought near to the surface, and the spade introduced under the trees, so as completely to intercept every perpendicular root.

The treddle spade used in this part of Hertfordshire is a very eligible instrument for this purpose, as the edge is steeled and very sharp. The following year, the third from planting, a trench may be again opened, at fifteen inches from the stem, so as not to injure the fibrous roots of the preceding summer's growth, and the knife and spade again used to cut all the spreading and perpendicular roots that are getting out of bounds. The fourth year the same operation may be repeated at eighteen inches from the stem; and in all subsequent root-pruning this distance from the stem must be kept. This will leave enough undisturbed earth round each tree to sustain as much fruit as ought to grow, for the object is to obtain a small prolific tree.

I find that in the course of years a perfect mass of fibrous roots is formed, which only requires the annual or biennial operation (the former if the tree be very vigorous) of a trench being dug, and the ball of earth heaved down to ascertain whether any large feeders are making

their escape from it, and to cut them off. But it must be borne in mind that this circular mass of soil will in a few years be exhausted; to remedy which, I have had left round each tree, eighteen inches from the stem, a slight depression of the soil, or, in other words, the trench has not been quite filled in. This circular furrow I have had filled, in December and January, with fresh liquid night soil, covering it with a coat of burnt earth two inches thick, which has had a most excellent effect. Any other liquid manure would undoubtedly have been equally efficacious, but my soil was poor, and I thought it required strong manure. As it did not come in contact with the roots, no injury resulted from using such a powerful raw manure.

There is, perhaps, no absolute necessity for liquid manuring in winter, as common dung may be laid round each tree in autumn, and suffered to be washed in by the rains in winter, and drawn in by the worms. In mentioning liquid manure, I give the result of my own practice. The great end to attain seems (to use an agricultural phrase) to be able "to feed at home;" that is, to give the mass of spongioles enough nutriment in a small space. A tree will then make shoots about four or six inches long in one season (for such ought to be the maximum of growth), and at the same time be able to produce abundance of blossom-buds and fruit. On trees of many varieties the former will be in too great abundance; removing a portion in early spring, cutting them out with a sharp knife, so as to leave each fruit-spur about three inches apart, is *excellent culture.*

I have not yet mentioned the possibility of root-pruning fruit trees of twenty or thirty years' growth with advantage. Irregular amputation of the roots of too vigorous fruit trees, is, I am aware, an old practice; but the regular, and annual or biennial pruning of them, so as to keep a tree full of youth and vigour in a stationary and prolific state, has not, that I am aware of, been recommended by any known author, although it may have been practised. In urging its applicability to trees of twenty or thirty years' growth, I must recommend caution: the circular trench should not be nearer the stem of a standard tree than three feet, or if it be a wall tree four feet, and only two-thirds of the roots should be pruned the first season, leaving one-third to support the tree, so that it cannot be blown on one side by the wind,—and these, of course, must be left where they will best give this support. The following season half the remaining roots may be cut, or, if the tree be inclined to vigour, all of them; but if it gives symptoms of being checked too much, they may, on the contrary, remain undisturbed for one or even two seasons. If, as is often the case in pear trees, the roots are nearly all perpendicular, the tree must be supported with stakes for one or two years after complete root-pruning.

The following extract from a letter recently received from C. Roach Smith, Esq., the archæologist, is interesting, as showing the prompt effects of root-pruning of trees:—"I have only been a horticulturist for three years; I took to two very beautiful *old* pear trees, which must

have cost no end of nailing, cutting, and staking. On inquiry, I found that one (a Summer Bon Chrétien) had never produced more than *one pear* annually; the other, upon a north wall, had *never* given a single pear. I could get no aid from any one what to do with these trees, and no book then accessible helped me. I reflected on the natural habit of the pear tree, and coming to the conclusion that the cause of barrenness was exuberance of roots, I resolved to cut them. Before the leaves had fallen, a friend sent me 'The Retired Gardener,' an old book, translated from the French. In it I found an account of some experiments made in England, which fortified me in the resolution I had taken. The first year the Summer Bon Chrétien[1] produced nine fruit. I pruned the roots more closely, and this year (1859), in spite of the ungenial spring, I saved fifty fine pears. The other tree yielded thirty-six, but of so vile a quality that I have re-grafted the tree. A large plum, treated in the same way, produced, the season after being root-pruned, 2000 fruit."

It will not, perhaps, be out of place here to enumerate a few of the advantages of systematic root-pruning and removing or lifting of pear, apple, and plum trees, and of growing them as pyramidal trees and bushes.

1st. Their elegibility for small gardens, even the smallest.

2ndly. The facility of thinning the blossom-buds, and in some varieties, such as Gansel's Bergamot, and other shy-bearing sorts, of setting

(1) This is one of our oldest varieties, and remarkable for being a very *shy bearer.*

the blossoms, and of thinning and gathering the fruit.

3rdly. Their making the gardener independent of the natural soil of his garden, as a few barrowfuls of rich mould and annual manure on the surface will support a tree for many, very many years, thus placing bad soils nearly on a level with those the most favourable.

4thly. The capability of removing trees of fifteen or twenty years' growth with as much facility as furniture. To tenants this will, indeed, be a boon; for perhaps one of the greatest annoyances a tenant is subject to is that of being obliged to leave behind him trees that he has nurtured with the utmost care.

My grey hairs tell me that I am not a young gardener, and yet I feel that in judicious root-pruning and annual manuring on the surface, so as to keep our fruit trees full of short well-ripened fruitful shoots, we are all inexperienced. At this moment I am reminded of a wall in a neighbouring garden, covered with peach and nectarine trees in the finest possible health.

For more than twenty years a healthy peach tree was never seen in this garden, as the subsoil is a cold white clay, full of chalk-stones. This happy change has been brought about by biennially pruning the roots of the trees early in autumn, as soon as the fruit is gathered; in some cases lifting the trees and supplying their roots with a dressing of leaf-mould, sand, and rotten manure, equal parts. Powdered charcoal, or the ashes of burnt turf and rotten manure, also make an excellent root-dressing for cold heavy soils; but if the soil be dry and poor, and unfavourable to the peach

and nectarine, loam and rotten manure is the best dressing for the roots, and also for the surface.

PLANTING AND AFTER-MANAGEMENT.

Pyramidal pear trees of from three to five years old on the quince stock, root-pruned, and full of blossom-buds, may now be purchased. Trees of this description should, if possible, be planted before Christmas; but if the soil be very tenacious, the holes may be opened in the autumn, and the trees planted in February; the soil will be mellowed and benefited by the frosts of winter.[1]

In planting pear trees on the quince stock, it is quite necessary that the stock should be covered up to its junction with the graft. This joining of the graft to the stock is generally very evident, even to the most ignorant in gardening matters; it usually assumes the form as given in Fig. 11, *a*.

If the soil be not excessively wet, the tree may be placed in a hole, three feet in diameter, in the usual way, so that the upper roots are on a level with the surface of the soil; but if wet and cold, they should be above the level of the surface. Some of the light compost recommended in page 17 should be filled in, and the tree well shaken, so that it is thoroughly mingled with its roots. The earth should then be placed round the stem, and formed into a mound, which should cover the stock up to, but not above, the junction of the graft with the stock, in order to encourage it

(1) The roots of pear trees on the quince stock, and indeed of all root-pruned trees are very fibrous. In planting it is good practice to give each tree two shovelsful of fine earth or mould rather dry—to place it on the roots and shake the tree so that the mould is well mixed with the mass of fibrous roots. Before the soil is all filled in, three or four gallons of water should be poured in so as to wash the earth into every crevice.

to emit roots into the surface soil, and to keep it—the stock—from becoming hard and "bark-bound."

To make this emission of roots more certain, the stem may be tongued, as usual in layering —*i. e.*, the bark must be cut through upwards from the root, and a slip about one inch in length raised (see Fig. 11, *b*, *b*, which are the raised pieces of bark); and these raised pieces

Fig. 11.

of bark must be kept open by inserting a piece of broken flower-pot or slate. Several of these tongues may be made, and by the end of the first year after planting every incision will have emitted roots; the stock, owing to its being kept constantly moist, will swell and keep pace with the graft, and the tree will flourish and remain healthy. As the mound will subside by the heavy rains of winter, presuming that

the trees have been planted in autumn, fresh compost of the same nature must be added in spring, and every succeeding autumn. A quarter of a peck of soot, strewed on the surface in a circle three feet in diameter round each tree in March, is an excellent stimulant. The great object in the culture of the pear on the quince stock is to encourage the growth of its very fibrous roots at the surface, so that they may feel the full influence of the sun and air. These mounds may be made ornamental if required, by placing pieces of rock or flint on them, which will also prevent the birds scratching at them for worms; but the stones selected must not be very large and heavy—they should be about the size and weight of a brick. In light friable soils, the mounds may be from three to four inches above the surface of the surrounding soil; in heavy retentive wet soils, from six to eight inches will not be found too high.

In soils of a light dry nature the pear on the quince requires careful culture. I therefore recommend the surface round the tree to be covered, during June, July, and August, with short litter, or manure, and to give the trees once a week, in dry weather, a drenching with guano water (about one pound to ten gallons), which must be well stirred before it is used. Each tree should have ten gallons poured gradually into the soil; by this method the finest fruit may be produced; and as it is very probable that, ere many years elapse, we shall have exhibitions of pears, this will be the mode to procure fine specimens to show for prizes. Our oldest gardening

authors have said that "pears engrafted on the quince stock give the fairest fruit;" and they are correct. It has been asserted that the fruit is liable to be gritty and deficient in flavour. I can only say that from my trees, growing on a cold clayey soil, I have tasted fruit of Marie Louise, Louise Bonne of Jersey, and others, all that could be wished for in size and flavour.

In the course of my experience, and since the above recommendation to plant on mounds was written, I have found it good practice in *very dry* soils to plant pear trees on the quince stock, with the junction of the graft just level with the surface, so as not to require mounds round their stems. The first season they should have some manure on the surface, laid in a circle round the stem; and the second year a shallow basin, two feet in diameter and four inches deep, should be dug round the stem, and filled with some manure about half-rotten. This basin thus filled will keep moist even in the most dry and hot weather, and will become full of fibrous roots. This is also an excellent method of renovating pear trees that have exhausted themselves by bearing too abundantly, or that appear unhealthy by their leaves turning yellow. In such cases, when the trees are of advanced growth, a basin of the same depth, but three or more feet in diameter should be formed, and filled with manure—in all cases for this purpose this should be but slightly decomposed.

GATHERING THE FRUIT.

The fruit of pears, more particularly those on quince stocks, should not be suffered to ripen on

the tree; the summer and autumn varieties should be gathered before they are quite ripe, and left to ripen in the fruit-room. The late pears should be gathered before the leaves take their autumnal tints; if suffered to remain too long on the trees they frequently never ripen, but continue hard till they rot. In most seasons, the first and second week in October is a good time; but much depends on soil and climate. The following passage from that very excellent work, Downing's "Fruit Trees of America," is appropriate to this subject:—

"The pear is a peculiar fruit in one respect, which should always be kept in mind, viz., *that most varieties are much finer in flavour if picked from the tree, and ripened in the house*, than if allowed to become fully matured on the tree. There are a few exceptions to this rule, but they are very few. And, on the other hand, we know a great many varieties which are only second or third-rate when ripened on the tree, but possess the highest and richest flavour if gathered at the proper time, and allowed to mature in the house. This proper season is easily known, first by the ripening of a few full-grown but worm-eaten specimens, which fall soonest from the tree; and, secondly, by the change of colour, and the readiness of the stalk to part from its branch on gently raising the fruit. The fruit should then be gathered—or so much of the crop as appears sufficiently matured—and spread out on shelves in the fruit-room, or upon the floor of the garret. Here it will gradually assume its full colour and become deliciously melting and luscious. Many sorts which if suffered to ripen in the sun and

open air are rather dry, when ripened within doors are most abundantly melting and juicy. They will also last for a considerably longer period, if ripened in this way—maturing gradually as wanted for use—and being thus beyond the risk of loss or injury by violent storms or high winds.

"Winter dessert pears should be allowed to hang on the tree as long as possible, till the nights become frosty.[1] They should then be wrapped separately in paper, packed in *kegs, barrels, or small boxes*, and placed in a cool, dry room, free from frost. Some varieties, as the Beurré d'Aremberg, will ripen finely with no other care than placing them in barrels in the cellar, like apples. But most kinds of the finer winter dessert pears should be brought into a warm apartment for a couple of weeks before their usual season of maturity. They should be kept covered, to prevent shrivelling. Many sorts that are comparatively tough if ripened in a cold apartment, become very melting, buttery, and juicy when allowed to mature in a room kept at the temperature of 60 or 70 deg."

The following is from Mr. Glass's "Gardening Book," as given in the *Gardener's Chronicle*:—

HOW TO STORE WINTER PEARS IN SMALL QUANTITIES.

"Get some *unglazed* jars,—garden-pots will do; make them perfectly clean, if they have ever been used. The best way is to half burn or bake them over again.

(1) I feel compelled to differ from Mr. D. in this respect; for in the autumn of 1855, I suffered many pears to hang on the trees till the end of October, and they never ripened. I believe the first week in October to be the best period to gather winter pears in.

"Gather your pears very carefully, so as not to rub off the bloom or break the stalk. On no account knock them about so as to bruise them. Put them on a dry sweet shelf, to sweat. When the sweating is over, rub them dry with a soft cloth, as tenderly as if you were dry-rubbing a baby.

"As soon as they are quite dry, put them, one over the other, into the jars or garden-pots, without any sort of packing; close up the mouth of the jar *loosely*, or of the garden-pot, by whelming the pan or placing a piece of slate over it, and stow them away in a darkish closet where they cannot get the frost.

"Open the jars now and then, to see how they are getting on.

"Do not put more than one sort in the same jar, if you can help it. Mind,—the warmer they are kept, the faster they will ripen."

KEEPING PEARS IN A GREENHOUSE.

I have but very recently found that pears may be kept in a greenhouse, in great perfection, all the winter.

The greenhouse in which my experiment has been tried is a lean-to house with a S.W. aspect, twelve feet wide, with a path in the centre, a bench in front of common slates laid on wooden bars, and a stage at back full of camellias. My pears have been laid on the front bench, the glass over them shaded till the end of November, the house ventilated, and the camellias watered just as if the pears were not there. In severe frosts the temperature was kept just above freezing. The autumn pears under this treatment ripened

slowly, and were of excellent flavour. The late pears kept till April; but then, owing to the power of the sun, the air of the house became too warm and dry, and they shrivelled. I should therefore recommend winter pears to be kept in the greenhouse in covered pots or jars, placing them in them early in December.

Mr. Tillery, of the Welbeck Gardens, keeps his choice pears and apples in boxes of bran with great success. The bran before it is used should be thoroughly dried and sifted, so as to take from it all the small particles of meal. With this treatment, pears and apples may be placed in it as soon as they are gathered. The boxes should be quite shallow, so as to admit of only one layer of fruit, which should be covered with the bran and no lids placed on the boxes.

PYRAMIDAL APPLE TREES ON THE PARADISE APPLE STOCK.

Apples as pyramids on the Paradise stock are objects of great beauty and utility. This stock, like the quince, is remarkable for its tendency to emit numerous fibrous roots near the surface, and for contracting the growth of the graft, causing it to become fruitful at a very early stage. On the Continent there are two varieties of the apple under this denomination—viz., the Doucin and the Pomme de Paradis: these are called Paradise stocks in England, but on the Continent the first and last are used for distinct purposes —the first for pyramids, the latter for dwarf bushes.

The Doucin stock is, I am inclined to think, the same as that called "Dutch Creeper," or "Dutch

Paradise," by Miller in his Dictionary, folio edition of 1759. It puts forth abundance of fibrous roots near the surface of the soil, and is not inclined to root deeply into it like the crab. Apples grafted on this stock are more vigorous than when grafted on the true Paradise stock, and less so than those on the crab; it is therefore, well adapted for garden trees, for they are easily lifted, their roots thus kept to the surface, and the tree consequently, kept free from canker. There is another surface-rooting apple, also well adapted for stocks—the Burr Knot. This, like the Doucin, will strike root, if stout cuttings, two or three years old, are planted two-thirds of their length in a moist soil: it is a large, handsome, and very good culinary apple. At Ware Park, in Hertfordshire, this is called Byde's Walking-stick Apple, owing to Mr. Byde, the former proprietor of the place, often planting branches with his own hand, which soon formed nice bearing trees.

Among apples raised from seed, some will occasionally be found with this surface-rooting nature; and this is, I suspect, the reason why the Doucin stock, under the name of the Paradise, common in the English nurseries, differs from the sorts used as Doucins in France, for there are two or three varieties cultivated there.

About forty years since, I raised a large number of apples from the pips of the Golden Pippin, Golden Reinette, Ribston Pippin, and other esteemed sorts. These in course of time all bore fruit, but as not one was found superior to its parent, I did not cultivate them. Why I mention this is, that among my seedlings were several that put out roots near the surface, and the cut-

tings of which struck root. It is only within these few years that I have had my attention drawn to one of these, which has very broad leaves, and a most healthy and vigorous habit. It roots freely at the surface, and bids fair to be a very superior stock for garden apple trees.

The Pomme de Paradis seems identical with the "dwarf apple of Armenia," referred to in the "Journal of the Horticultural Society," Part 2, Vol. 3, page 115. It is *exceedingly* dwarf in its habits, and too tender for this climate, unless in very warm and dry soils. Out of 2000 imported in 1845, more than half died the first season, and two-thirds of the remainder the following. They were planted in fine fertile loam, favourable to the growth of apples, and on which the Doucin, planted the same season, grew with the greatest vigour. The same result attended an importation of 2000 in 1846. I have now potted some plants, and owing, as I suppose, to the roots being warmed through the pots by exposure to the sun, they seem inclined to make very nice little fruitful bushes—in fact, real miniature apple trees, bearing fruit when only nine inches in height. My trees are in eight-inch pots; but to have healthy fertile trees, I should recommend them to be gradually shifted into twelve-inch-pots. The citizen may thus have his apple orchard on the leads of his house.

The Doucin and the English Paradise are most deserving of our attention as stocks for forming fruitful pyramids, the culture of which is very simple. Grafted trees of one, two, or three years' growth, with straight leading stems, well

furnished with buds and branches to the junction with the stock should be planted. No manure should be placed to their roots, but some light friable mould should be shaken into them, the earth filled in, and two or three shovelsful of half-rotted manure laid on the surface round each tree. This surface-dressing may be given with advantage every succeeding autumn. If the soil be very wet and retentive, or very shallow, it will be better to plant the trees in small mounds; and if symptoms of canker make their appearance their roots should be examined annually in the autumn, as recommended in root-pruning of pears on the quince stock, introducing the spade directly under the roots, so as to prevent any entering deeply into the soil, and bringing all as nearly to the surface as possible, filling in the trench with light friable compost. I firmly believe that canker may be entirely prevented by this annual attention to the roots.

If, therefore, the soil be unfavourable, and apt to induce a too vigorous growth in apple trees, followed by canker, the roots should be annually root-pruned, or the trees lifted—*i. e.*, taken up and replanted. If, however, the trees make shoots of only moderate vigour, and are healthy and fruitful, their roots may remain undisturbed; and pinching their shoots in summer, as directed for pyramidal pears, page 8, and training them in a proper direction if required, is all that they will want. Pyramids on the Paradise stock may be planted four feet apart in confined gardens; five feet will give them abundance of room: but if, *owing to the soil* being of extra fertility, they are

found to require more, the trees, if they have been root-pruned, may be removed almost without receiving a check, even if they are twenty years old. This is a great comfort to the amateur gardener, who amuses himself with improving his garden; for how often does a favourite fruit tree, which cannot be removed, prevent some projected improvement!

Apples differ greatly in their habits of growth: some are inclined to grow close and compact, like a cypress—these are the proper sorts for pyramids; others, horizontally and crooked—these should be grown as bushes; others, again, are slender and thin in their growth—the lower part of every branch will then generally be furnished with dormant buds; so that, to form a good pyramid of these slender-growing varieties, it is necessary to begin the first year with a graft, and to pinch the leader as soon as it is six inches long. If by any neglect the lower part of the pyramid be not furnished with shoots, but have dormant buds, or buds with only two or three leaves attached, a notch must be cut, about half an inch in width, just *above* the bud from which a shoot is required. This notch must be cut through the outer and inner bark, and alburnum, or first layer of wood; and if the shoot or stem be young—say from two to four inches in girth—it may be cut round half its circumference. If this be done in spring or summer, the following season a shoot will generally make its appearance; sometimes even the first season, if the stem or branch be notched early in spring. This method of procuring shoots from dormant buds may be applied with advantage to all kinds of fruit trees, except

the peach and nectarine, which are not often inclined to break from a dormant bud.

Varieties of apples, inclined to be compact and close in their growth, form very handsome pyramids; but they are apt to be unfruitful, as air enough is not admitted to the interior of the tree. This may be easily avoided, by bringing the lateral shoots down to a horizontal position for a year or two, and fastening the end of each shoot to a stake, an open pyramidal shape will thus be attained, which the tree will keep. Other varieties put forth their laterals horizontally, and some are even pendulous. The leading perpendicular shoot of varieties of this description must be supported by a stake, till the tree is of mature age. Iron rods, about the size of small curtain-rods, are the most eligible: these, if painted with coal-tar and lime, sifted and mixed with it to the consistence of very thick paint, put on boiling hot, will last a great many years.

Apple trees in confined gardens near large towns, are often infested with "American blight," *aphis lanigera;* this makes its appearance on the trees generally towards the middle of summer, like patches of cotton wool. There are many remedies given for this pest; the most efficacious I have yet found is soft soap dissolved in soft water, one pound to the gallon, or the Gishurst Compound, sold by Price's Candle Company, half a pound to the gallon, and applied with an old painter's brush. About two days after the application the trees must be well syringed with clean water. Many remedies, such as train oil, spirits of tar, &c., are apt to injure the trees; it must be *recollected that* soft soap will turn the leaves

brown—in fact, kill them; but it need not be applied to them, as the *aphis* generally fixes itself on the branches.

Here let me impress upon the lover of his garden, living anywhere within reach of smoke, the necessity of using the syringe: its efficacy is not half appreciated by gardening amateurs. As soon as the leaves of his fruit trees are fully expanded, every morning and every evening, in dry weather, should the attentive gardener dash on the water with an unsparing hand—not with a plaything, but with the perforated common syringe, such as a practical gardener would use, capable of pouring a sharp stream on to the plant, and of dislodging all the dust or soot that may have accumulated in twelve hours. For apple and pear trees in pots, or in small city gardens, this syringing is absolutely necessary.

Pinching the shoots of pyramidal apple trees, and, indeed, exactly the same method of managing the trees as given for pyramidal pears on the quince stock, may be followed with a certainty of success; and the proprietor of *a very* small garden may thus raise apple trees which will be sure to give him much gratification. To have fine fruit, the clusters should be thinned in June; and small trees should not be overburdened, for they are often inclined, like young pear trees on the quince stock, to bear too many fruit when in a very young state; the constitution of the tree then receives a shock, which it will take two or three seasons to recover. For varieties with large fruit, one on each fruit-bearing spur will be enough; if a small sort, from two to three will be sufficient.

There are so many really good apples that it is difficult to make a selection: the following sorts will not disappoint the planter; but fifty varieties in addition, quite equal in quality, could be selected.

Twenty dessert apples, ripening from July to June, placed in the order of their ripening:—

1. White Joaneting *
2. Early Red Margaret
3. Red Astrachan
4. Early Strawberry
5. Irish Peach *
6. Summer Golden Pippin
7. Kerry Pippin *
8. Margil
9. Ribston Pippin *
10. Cox's Orange Pippin *
11. Mannington's Pearmain
12. Golden Drop (Coe's) *
13. Ashmead's Kernel*
14. Nonpareil, Old
15. Reinette Van Mons*
16. Syke House Russet
17. Keddleston Pippin *
18. Golden Harvey
19. Winter Peach Apple
20. Sturmer Pippin *

Twenty kitchen apples, fit for use from July to June:—

1. Keswick Codlin *
2. Large Yellow Bough
3. Hawthornden *
4. Cellini
5. King of the Pippins
6. Blenheim Pippin *
7. Calville Blanche
8. New Hawthornden
9. Striped Beefing *
10. Waltham Abbey Seedling
11. Herefordshire Pearmain *
12. Winter Pearmain
13. Bedfordshire Foundling *
14. Greaves' Pippin
15. Dumelow's Seedling *
16. Norfolk Bearer
17. Rymer
18. Baxter's Pearmain *
19. St. Sauveur *
20. Gooseberry Apple *

APPLES AS BUSHES ON THE PARADISE STOCK.

There are some varieties of apples that do not form, even with care, well-shaped pyramids; such sorts may be cultivated as bushes when grafted on the Paradise stock, and are then excellently well adapted for small gardens. I have, indeed, reason to think that quite a revolution may be brought about in suburban fruit culture by these bush trees. I have shown, in pages 16 and 17, *how bush pears* on quince stocks may be culti-

vated. Pears are, however, a luxury: apples and plums are necessaries to the families of countless thousands living near London. A piece of ground 25 feet by 4, or 100 square feet, will hold six apple bushes planted 4 feet apart; 200 square feet will admit of twelve trees, and so on, so that many a small neglected border attached to a cottage may be made into an orchard. The trees should be removed biennially, as recommended for bush pears, by digging a circular trench one foot from the stem of the tree, and then introducing the spade under its roots, heaving it up so as to detach them all from the soil, and then filling in the earth dug from the trench and treading it gently on to the roots. The summer pinching is done by cutting or pinching off the point of every shoot as soon as it has made four leaves, leaving three. The following sorts are well adapted for this bush culture, but the upright varieties recommended for pyramids form nice compact bushes.[1]

Brabant Bellefleur, kitchen	April
Cornish Aromatic, dessert	May
Early Harvest, dessert	August
Emperor Alexander, kitchen	October
Gravenstein, kitchen or dessert	November
Hawthornden, kitchen	August to November
Joanneting (white), dessert	July
Melon Apple, dessert	February
Mère de Ménage, kitchen	December
Nonesuch, kitchen	October
Pomme Royale, kitchen or dessert	April
Reinette de Canada, kitchen or dessert	May
Ribston Pippin, dessert	December
South Carolina Pippin, kitchen	December
Spring Ribston Pippin, dessert	May
Victoria, dessert	Apr l
Waltham Abbey Seedling, kitchen	December

(1) These dwarf bushes are liable to be gnawed by rabbits and hares in exposed gardens. The best of all preventives is to paint them with soot and milk, well mixed.

PYRAMIDAL APPLES ON THE CRAB STOCK.

In soils light and poor, the apple on the Paradise stock is, unless carefully manured on the surface, apt to become stunted and unhealthy. In such soils, and also in those of a *very* tenacious nature, pyramids on the crab stock may be planted with great advantage. They are also well adapted for large gardens where large quantities of fruit are required, as the trees may be made to form handsome pyramids, from twelve to fifteen feet in height.

There is one thing most essential to their full success as pyramids,—they must be lifted or taken up biennially early in November, and replanted in the manner recommended for bush pear trees.

As these crab-stock trees grow more freely than the paradise-stock trees, summer pinching, or shortening the young shoots with a penknife, as recommended in page 61, must be attended to, and then, in the most unfavourable apple tree soils, healthy and most prolific pyramids may be formed. Any of the varieties recommended in pages 60 and 61 will succeed well as pyramids on the crab stock.

If managed in this manner, fine trees may be formed, not only of the robust-growing kinds, but even of the old Nonpareil, Golden Pippin, Golden Reinette, Hawthornden, Ribston Pippin, and several others, all more or less inclined to canker. I have a row of Nonpareils and Ribston Pippins planted in the coldest and most unfavourable soil I could find, yet, owing to *their being* biennially removed, they are entirely *free from canker.*

The vigorous growth of standard apples, when planted in orchards in the usual way, is well known, and also their tendency to canker after a few years of luxuriant growth. Pyramids on the crab, without biennial removal, would, in like manner, grow most freely, and even if subjected to summer pinching, would soon become a mass of entangled, barren, cankered shoots.

PYRAMIDAL PLUM TREES.

The plum, if planted in a rich garden soil, rapidly forms a pyramid of large growth,—it, in fact, can scarcely be managed by summer pinching. It becomes crowded with young shoots and leaves, and the shortening of its strong horizontal branches at the end of summer is apt to bring on the gum: it is a tree, however, with most manageable roots, for they are always near the surface. I must, therefore, again recommend summer pinching to three leaves, as directed for pears, page 8, annual root-pruning, and surface-dressing, in preference to any other mode of culture. The annual root-pruning of the plum is performed as follows:—Open a circular trench eighteen inches deep round the tree, eighteen inches from its stem, and cut off *every root and fibre* with a sharp knife. When the roots are so pruned, introduce a spade under one side of the tree, and heave it over so as not to leave a single tap-root; fill in your mould, give a top dressing of manure, and it is finished. The diameter of your circular trench must be slowly increased as years roll on; for you must, each year, prune to within one-and-a-half or two *inches of* the stumps of the former year. Your

circular mass of fibrous roots will thus slowly increase, your tree will make short and well-ripened shoots, and bear abundantly. From very recent experience, I have found that removing the trees annually, if the soil be rich, —biennially, and adding some rich compost, if it be poor—*without root-pruning*, will keep plum trees in a healthy and fertile state. For further particulars on this head see pages 78 and 79.

Pyramidal plum trees are most beautiful trees both when in flower and fruit. Their rich purple and golden crop has an admirable effect on a well-managed pyramid. No stock has yet been found to cramp the energies of the plum tree. I have, however, tried experiments on the sloe, which, as it never forms a tree of any bulk, effects this object to a certain extent. My trees on the sloe are some years old, and are dwarf and prolific. The first year after grafting they made vigorous growth; but this is a very common occurrence with stocks that ultimately make very prolific trees; it is so with the pear on the quince, the apple on the Paradise, and the cherry on the Mahaleb. The greengage seems to grow more freely on the sloe than any other sort. I have three fine vigorous bushes, now about ten years old, growing in the white marly clay, with chalk-stones, peculiar to some parts of Essex and Hertfordshire. The sloe seems to delight in this soil, so inimical to most kinds of fruit trees. My greengage plums are almost vigorous in their growth; and what appears strange is, that the stock seems to keep pace *with the graft*—there is scarcely any swelling

at the junction. The roots of these trees have not been touched, and they appear to have gone deeply into the solid white clay. The plum on the sloe is easily arrested in its growth by root-pruning. I have some trees, four years old, not more than eighteen inches high, and yet covered with bloom buds.[1] These have been only once root-pruned, and are forming themselves into nice compact prolific bushes. As no peculiar culture, or disease, requires to be noticed, I have only to give a selection of sorts calculated for pyramids. These are also well adapted for walls with W., N.W., E., or S.E. aspects.

HARDY DESSERT PLUMS ADAPTED FOR PYRAMIDS.

In season from July to the end of October. Placed in the order of their ripening.

Early Favourite *
July Green Gage *
De Montfort
Oulin's Golden Gage
Green Gage *
Jefferson *
Kirke's *
Transparent Gage
Purple Gage
Guthrie's Late Green
Reine Claude de Bavay *
St. Martin's Quetsch

HARDY KITCHEN PLUMS ADAPTED FOR PYRAMIDS.

In season from July till the end of October. Placed in the order of their ripening.

Early Prolific *
Prince of Wales *
Nectarine
Pond's Seedling
Prince Englebert
Victoria, or Alderton *
Mitchelson's
Diamond *
Imperial de Milan
Autumn Compote *
Late Black Orleans *
Belle de Septembre *
Prune Tardive

PLUM TREES AS BUSHES.

There is, perhaps, no fruit tree so easily kept within bounds as the plum. In rich soils they

(1) Since this was written I have found plums grafted on the plum stock so easily dwarfed by annual or biennial removal, that unless in hard clayey soils, *found to be unfavourable to the plum*, there is no occasion to employ *the sloe stock*.

bear annual removal without the least check; but in most soils biennial removal will keep them in a perfectly fruitful state in bush culture. This is absolutely necessary; and if the soil be poor, some thoroughly rotted manure (about half a bushel to each tree) may be mixed with the soil in replanting. As with pear trees, the best season for lifting or removing them is the end of October or beginning of November. Plum bushes have the advantage of being easily protected by a square of light cheap calico, tiffany, or any light material, thrown over them while in blossom, and a crop of fruit thus insured. All the varieties recommended for pyramids may be cultivated as bushes, and for suburban gardens, they should be subjected to exactly the same treatment as recommended for apple bushes, page 61.

CHERRIES AS BUSHES AND PYRAMIDS ON THE MAHALEB STOCK (CERASUS MAHALEB).

This stock has been long known in our shrubberies as the "Perfumed Cherry:" its wood when burned emits a most agreeable perfume. In France it is called "Bois de St. Lucie," and it has been there used for dwarf cherries for very many years;—why it has not been employed by English nurserymen, I cannot tell. My attention was called to it in France some fifteen or twenty years ago, since which I have used it extensively, annually increasing my culture. Its great recommendation is, that cherries grafted on it will flourish in soils unfavourable to them on the *common cherry* stock, such as strong white clay, *or soils with* a chalky subsoil. Although the

trees grow most vigorously the first two or three seasons, yet, after that period, and especially if root-pruned, they form dwarf prolific bushes, so as easily to be covered with a net, or, what is better, with muslin or tiffany, which will protect the blossoms from frost in spring, and the fruit more effectually from birds and wasps in summer; thus giving us, what is certainly most rare, cherries fully ripe, and prolonging their season till the end of September. These dwarf bushes may be planted from five to six feet apart, and their branches pruned so that seven, or nine, or more, come out from the centre of the plant, like a well-managed gooseberry bush. These branches will, in May or June, put forth, as in the horizontal shoots of pyramidal pears, several shoots at their extremities, all of which must be pinched off to three leaves, leaving the leading shoots untouched till the middle or end of August, when they must be shortened, and the pruning for the year is finished.

The Morello and Duke cherries—the most eligible for this bush culture—may have their leading shoots shortened to eight buds. If, however, the space be confined in which they are planted, this length may be reduced, for by biennial root-pruning the trees may be kept exceedingly dwarf. The end is to form the tree into a round bush, not too much crowded with shoots. Towards the end of September,[1] or, in fact, as soon as the autumnal rains have sufficiently penetrated the soil, a trench may be dug round the tree, exactly the same as recommended for root-pruning of

(1) This early autumnal root-pruning will be found very advantageous. *The flow of sap is checked*, so that the shoots are well ripened, and the *pruned roots soon* emit fresh fibres to feed the tree the following season.

pears, the spade introduced under the tree to cut all perpendicular roots, and all the spreading roots shortened with the knife, and brought near to the surface, previously filling in the trench with some light friable soil for them to rest on, and spreading them regularly round the tree, as near to the surface as possible; then covering them with the soil that was taken out of the trench. No dung or manure of any kind is required, as this stock seems to flourish in the poorest soils. Some short litter or half-decayed leaves will, however, be of much benefit placed on the surface round the stem.

I have thus far given their culture for small gardens; but those who have more space may dispense with root-pruning, and allow their cherry trees to make large bushes, which may be planted eight feet apart, and pinched regularly in the summer, and managed as directed for pear trees (page 8). The leading shoot from each branch in such cases must be left longer, and shortened to twelve or more buds.

The most charming of all pyramids are the varieties of the Duke and Morello cherries on the Mahaleb; these by summer pinching, as practised for pyramidal pears, become in two or three years the most delightful fruit trees ever seen, for in spring they are perfect nosegays of flowers, and in summer clusters of fruit—if spared by spring frosts.

The Morello cherry, on the Mahaleb stock, cultivated as a pyramid, forms one of the most prolific of trees. Any garden, however small, may grow enough of this useful sort by planting a few pyramids, lifting and replanting them *biennially, and* pinching in *every* shoot to three

leaves all the summer as fast as they grow, in the manner recommended for apple bushes (page 61). The Kentish cherry, also a most useful culinary sort, may be cultivated as a pyramid with great success. A French variety grown near Paris, in large quantities, and known as the "Cerise Aigre Hâtive," which may be Englished by calling it the Early Sour Cherry, is a most useful kind for the kitchen. In going from Paris a year or two ago to Versailles by the "Rive Droite" Railway, I was much struck by seeing in the market gardens between Suresnes and Puteaux, on the left, large plots of dwarf trees about the size of large gooseberry bushes, and some very low trees, all covered (as they appeared to me from the railway carriage) with bright red flowers. I found, on inquiry, that these were cherry bushes,—literally masses of fruit, of the above variety, the most prodigal bearer known. The trees are generally propagated by suckers, but succeed very well on the Mahaleb stock, and form very nice pyramids.

I need scarcely add, that the culture of all the Duke tribe of cherries by closely pinched-in pyramids, biennially removed, is most satisfactory. It is, perhaps, more easily performed than root-pruning, and the trees soon form perfect pictures. I have seen nothing in fruit-tree culture more interesting than handsome compact pyramids of such sorts of cherries as the May Duke, Duchesse de Palluau, Empress Eugénie, and Archduke. One feels surprise to find that as yet but few lovers of gardening know of the existence of such trees.

It will much facilitate the operation on their roots if the trees be planted on small mounds.

In forming plantations of pyramidal and dwarf cherries on the Mahaleb stock, it is necessary to arrange them with a little care. The two groups, those of the habit of the Morello tribe, and those of the compact habit of the May Duke, should be planted in separate rows. Bigarreau and Heart cherries are too short-lived, when grafted on this stock, in most descriptions of soils, to be recommended.

A PYRAMIDAL MORELLO CHERRY TREE.

Fig. 12.

The following arrangement will assist the planter :—

SECTION I.—THE MAY DUKE TRIBE.

Arch Duke *	Belle de Choisy
May Duke *	Nouvelle Royale
Royal Duke *	Empress Eugénie
Jeffrey's Duke	Duchesse de Pailuau

SECTION II.—THE MORELLO TRIBE.

Carnation (Coe's late) *	Reine Hortense *
Kentish	Aigre Hâtive
Late Duke *	Belle de Sceaux
Griotte de Chaux *	Belle Magnifique
Morello *	Abbess d'Oignies

Cherries planted on the Cerasus Mahaleb are eminently adapted for espaliers, or for walls, as they occupy less space, and are much more fertile. They may be planted twelve feet apart, whereas espaliers on the cherry stock require to be planted eighteen or twenty feet apart. For potting, for forcing, cherries on this stock are highly eligible, as they are very prolific.[1]

BIGARREAU AND HEART CHERRIES AS PYRAMIDS ON THE COMMON CHERRY STOCK.

Among the mysteries of vegetable physiology, there is nothing, perhaps, more interesting than the facts discovered by the fruit-cultivator. Many kinds of pears grow with great luxuriance when grafted or budded on the quince stock, while other kinds, cultivated in the same soil, and budded or grafted with equal care, will grow feebly, and die in the course of a year or two.

The Noblesse and Royal George peaches form fine healthy trees when budded on the Muscle plum stock. The Grosse Mignonne and the French

(1) Cherry trees are often infested in summer with the black aphis. The best remedy is the Gishurst Compound, four ounces dissolved in a gallon of soft water, and the trees repeatedly syringed with it.

Galande die in a year or two, if budded on it. The Moor Park apricot grows readily and freely on the above-named stock. The peach apricot, its French congener, will not; why? The Bigarreau and the Heart cherries (or, as the French call them, Guignes) do not succeed well on the Cerasus Mahaleb; they grow most rapidly for two or three years, and then generally become gummy and diseased.

The stock raised from the small black and red wild cherries is the proper one for this race.

Pyramidal cherry trees may be bought ready-made, or formed by purchasing young trees, one year old, from the bud, and training them up in the same way as directed for pyramidal pears (pages 4 and 5), with this variation,—pears, as is well-known, may be grown as pyramids successfully, with or without root-pruning or biennial removal; but cherries on common cherry stocks will grow so rapidly, in spite of summer pinching, that biennial removal is a work of necessity. In the course of a few years pyramidal cherry trees thus treated become pictures of beauty. In France they generally fail, and become full of dead stumps and gum, owing to their trusting entirely to pruning their trees severely in summer and winter, without attending to their roots; the trees thus being full of vigour make strong shoots, only to be pinched and cut off. We must "manage these things better" in England.

The mode of operation in removing pyramidal cherries is the same as that recommended for pears and apples, &c. It will be found, however, that more labour is required, for in two years the

cherry on the common stock, like the apple on the crab, makes a vigorous attempt to lay hold of its parent earth. The second year the tree may be lifted by digging a trench round its stem, 1 foot from it and 16 inches deep. The fourth year this trench must be 18 inches from the stem and 20 inches deep; the sixth year it should be 2 feet from the stem and 2 feet deep. This distance and depth need not be departed from if the trees are required to be only fair-sized pyramids; the straggling roots beyond this circumference should be biennially pruned off with the knife. The tree managed thus will soon be in a mature, fruitful state, and its roots a mass of fibres, so that when removed it will, like a rhododendron, receive only a healthy check.

Pyramidal Bigarreau and Heart cherries, cultivated after the method above given, may be planted in small grass orchards, with pyramidal pears on pear stocks, pyramidal apples on crab stocks, and pyramidal plums. A charming orchard in miniature may thus be formed. Cattle and sheep must of course be excluded.

The following varieties form handsome pyramidal trees, and bear fruit of the finest quality:—

Belle d'Orleans *	Elton *
Bigarreau	Florence *
Bigarreau Napoléon	Governor Wood *
Black Eagle *	Knight's Early Black *
Black Tartarian	Ohio Beauty
Downton	Werder's Early Black

I have thus far given the results of my experience in the culture of pyramidal trees. The method is not by any means new, for visitors to the Continent, for these last fifty years, must have often observed the numerous pyramids of

France and Belgium. The system of annual and biennial root-pruning I must, however, claim as original, for I feel assured that in our moist climate—too moist for many varieties of fruit—such check is required to keep pyramids that are under summer pinching in a healthy, fruitful state. The defect in the pyramidal trees of the Continental gardeners, is their tendency to an enormous production of leaves and shoots, brought on by severe annual pruning of their shoots. The climate is probably too dry for root-pruning: yet I cannot help thinking that if it were followed by manuring thickly on the surface, and occasional watering, it would make their trees prodigiously fruitful.

At the risk of repetition, and writing from my own experience, I must say that no gardening operation can be more agreeable than paying daily attention to a plantation of pyramids. From the end of May to the end of July—those beautiful months of our short summer—there are always shoots to watch, to pinch, to direct, fruit to thin, and a host of pleasant operations, so winning to one who loves his garden and every tree and plant in it. To conclude, I may mention that the small Alberge apricot, raised from the stone, and producing small high-flavoured fruit, and also the Breda apricot, make very beautiful pyramids if lifted or planted biennially. In the southern counties of England, in a favourable season, they will ripen their fruit, and produce good crops. The large Portugal quince is also very prolific as a pyramidal tree. Some trees only two years old have borne fine fruit here. This *is the finest of* all the quinces, and in the south

of Europe it grows to an enormous size. The medlar will also form a handsome and productive pyramid; and, "last but not least" in the estimation of the lover of soft fruits, the currant. A near neighbour—an ingenious gardener—attaches much value, and with reason, to his pyramidal currant trees; for his table is supplied abundantly with their fruit till late in autumn. The leading shoots of his trees are fastened to iron rods; they form nice pyramids of about five feet in height; and by the clever contrivance of slipping a bag made of coarse muslin over every tree as soon as the fruit is ripe, fastening it securely to the bottom, wasps, and birds, and flies, and all the ills that beset ripe currants, are excluded. With all these, summer pinching and root-pruning, or biennial removal (except the currant, which does not require the latter operation), as directed for pears, are indispensable; they soon form very handsome pyramids, and make a pleasing variety in the fruit garden.

FILBERTS AND NUTS AS STANDARDS.

Filberts, as commonly cultivated, except in the Kentish gardens, form straggling bushes, and are some years before they commence to bear. To correct this, I some ten or more years since had them grafted on stems of the hazel-nut raised from Spanish nuts, as they were vigorous growers and formed stout stems. I have found these grafted trees answer admirably, and come quickly into bearing, forming nice garden trees.

As soon as the nut trees designed for stocks have made stout stems about four feet high, they should be grafted at that height with the choice

kind of nuts, such as the red and white filberts, and the Cosford nut,—an excellent nut. The Purple-leaved filbert, generally planted as an ornamental shrub, may also be grafted; it gives nuts equal to the common filbert, and forms a nice ornamental standard.

Standard nuts require but little culture; they soon form round heads, and bear profusely. Care must be taken to destroy all suckers from the stem and root.

The only pruning required is in winter to thin out the crowded shoots, and shorten to half their length those that are inclined to be vigorous —that is, those that are more than nine inches in length. The short spray-like shoots must not be shortened, as they are the fruit-givers.

If these standard nuts are planted in rich garden soils, they will soon make trees too large for small gardens. If, therefore, they are found to grow too vigorously they should be lifted and replanted biennially in November.

I have mentioned seedling nuts as good for stocks; but I have lately employed a valuable sort, introduced from Germany as Corylus arborescens; this makes a beautiful clear stem.

The Algiers nut, Corylus algerensis, seems also to be well adapted for a stock for standards, as it makes shoots from six to seven feet in one season.

FIGS AS HALF STANDARDS OR BUSHES.

There is, perhaps, no fruit tree that disappoints the amateur fruit grower so much as the fig. If planted in the open borders of the garden, it soon *grows into* an enormous fruitless bush or tree, and if

placed against a wall, unless a very large space can be given to it, but little fruit must be expected.

It may, however be made eligible for small gardens, where the climate is sufficiently warm to ripen its fruit, such as the gardens near London, and those in the eastern and southern counties. Fruitfulness and moderate growth are brought on by the following method. Trees should be procured of the Brown Turkey or Lee's Perpetual, White Marseilles and Early Violet Figs—these are the only kinds that bear freely, and ripen their fruit well—such trees should be low or half standards, or dwarfs with a clear stem (not bushes branching from the ground). The former should have a stem three feet high, and the latter one from one foot to eighteen inches; in each case the tree should have a nice rounded head.

Trees thus selected should be planted in a sunny situation, and require only the following simple mode of treatment. They, we will assume, were planted in March or April. They will make a tolerably vigorous growth, and must be pruned by pinching off the top of every shoot as soon as it has made six leaves, leaving five. The stem must be kept quite clear from young shoots. By the autumn, nice round-headed trees will be formed, and about the end of October they should be taken up (their leaves cut off, if they have not fallen) and placed in a cellar—no matter if dark, but a light dry cellar would be preferable—some earth should be placed over their roots, and there they may remain till the first week in May, when they should be planted out, and the same routine of culture followed. They will bear one good crop of fruit in a season, and ripen it in September.

This annual removal brings on great sturdiness of growth in the tree, and the roots become so fibrous as to hold a large quantity of earth, which should not be shaken from them when they go into their annual winter abode. I have seen trees many years old that had been treated in this manner. Their stems were stout as a man's leg, and their heads full of fruit.

THE BIENNIAL REMOVAL OF FRUIT TREES WITHOUT ROOT-PRUNING.

For some few years past I have felt a growing conviction that peach trees trained against walls in the usual manner, without careful root cultivation, cannot, in our climate, be kept in a state at all healthy or fertile for a series of years. A wall covered with healthy peach and nectarine trees of a good ripe age is rarely to be seen; failing crops and blighted trees are the rule, healthy and fertile trees the exception. In page 45 will be found an allusion to the trees on the walls at Quendon Hall. I have reason to believe that all the success which the late Mr. Sillett had with his trees was owing, in the first place, to root-pruning, and afterwards to lifting and replanting his trees biennially, shortening an occasional straggling root, and giving to each tree some rich light compost. The following mode of treating peaches, nectarines, apricots, and plums on the removal system, I have found simple and efficacious.

Supposing a trained tree, of the usual size, to have been planted in a border well prepared—*i. e.*, stirred to a depth of twenty inches; it may be trained to the wall as usual, and suffered to *grow two seasons*. Towards the end of October,

or indeed any time in November in the second season, it should be carefully taken up, with all its roots intact. If there be two or three stragglers —*i. e.*, roots of two or three feet in length—for roots are remarkably eccentric, and often, without any apparent cause, run away in search of something they take a fancy to—cut off one foot or so, so as to make the roots of the tree more snug. Then make the hole from whence you took your tree a little deeper, and fit to receive its roots without bending or twisting. Place in it any light compost—if the soil be heavy, leaf-mould, rotten manure, and loam, equal parts; if it be light, two-thirds tender loam, not sandy and one-third rotten manure. Two inches deep of this compost will be enough for the roots of the tree to rest on,—and mind they are carefully arranged so as to diverge regularly,—then add enough of the compost to cover all the roots, and fill in with the common soil, so as not to cover the surface roots more than two inches deep. If the soil be light, the surface should be trodden down very firmly, and then have a dressing of old tan, or decayed litter.

A tree that has been planted two years will require one barrowful of the above compost; at the end of four years, two barrowfuls; when six years have passed, from three to four barrowfuls; and from four to six barrowfuls will be enough for a tree from twelve to twenty years old—in short, for a full-grown tree. A portion of the earth from the border must be removed when a large quantity of compost is added, to make room for it, so as not to have an unsightly mound. In the course of two or three removals the roots of

the tree will become a mass of fibres, and the trees so docile as to be lifted without difficulty.

I have this day (Dec. 12, 1852) removed two plum trees that have been planted six years and removed twice. Their roots are a mass of fibres without one straggling root; they have been replanted with a barrowful of light compost to each tree,[1] and if I may judge by the enormous quantity of blossom buds, they will bear a plentiful crop next season. They will receive no unhealthy check, for abundance of earth adheres to the mass of fibrous roots. Now, as peaches, nectarines, and apricots, being budded on plum stocks, are all on plum roots, they will give exactly the same results from the same mode of culture, neither the *size* nor *flavour* of the fruit will be affected, and the trees will always bear abundantly, and be healthy and flourishing.

The plethoric habit of the Moor Park and Peach apricots, which so often leads to disease and death, will be effectually cured by this simple mode of culture, and peaches and nectarines will make short annual shoots, which will be always well ripened, so that they will be constantly full of healthy blossom-buds. For trees under Mr. Ker's trellises it answers admirably. Some mulch, or old tan, two inches in depth, placed on the surface of the soil as far as the roots spread during the spring and summer, will be of much service.

(1) The soil is rich, and one barrowful I thought quite enough. The quantity of compost must be regulated by the wants of the soil, for in rich soils, where peaches and nectarines are apt to grow too freely, no compost need be added, but the tree merely lifted and replaced. A peach, nectarine, or apricot tree under the removal system, that makes annual shoots more than fifteen inches in length, is too luxuriant, and will require no compost *to its roots when replanted.*

All trees that are inclined to make very fibrous roots, such as plums, pears on quince stocks, and apples on Paradise stocks, may be lifted—*i. e.*, removed biennially, as above described—with equal or greater facility than root-pruning them. The effect is the same: they make short well-ripened shoots, and bear abundantly. Apples on Paradise stocks, cultivated as dwarf bushes or as pyramids, if lifted *every year*, and a shovelful or two of compost given to them, form delightful little trees.[1] The most delicate sorts of apples, such as Golden Pippins and Nonpareils, may thus be cultivated in the most unfavourable soils; and roses, more particularly Bourbon roses on short stems, and Hybrid Perpetuals, removed annually in the autumn, giving to each tree a shovelful of rich compost, and not pruning their shoots till April, will bloom delightfully all the autumn, never dropping their leaves towards the end of summer, and becoming, as is too often the case, blighted and blossomless.

HOW TO PREPARE A PEACH TREE BORDER IN LIGHT SOILS.

In our southern counties, where light sandy soils abound, the difficulty of making peach and nectarine trees trained to walls flourish is well known; in spring they are liable to the curl and the attacks of aphides, in summer they are infested with the red spider, so that the trees are weakened, and rarely give good fruit; they seem indeed, to detest light soils. The following method of pre-

(1) In moist retentive soils the fruit-spurs of small trees become covered with moss; some powdered lime sprinkled over them will destroy it; this *is best done in foggy* weather in winter.

paring borders for them in such soils may be "as old as the hills," but I have not seen it described by any gardening author. The idea has come to me from observing peach trees, trained to walls, refuse to do well in the light sandy soil forming a part of my nursery, except near paths, and to grow and do well for years in the stiff tenacious loam forming another part. My bearing trees in pots, for which I use tenacious loam and dung, rammed down with a wooden pestle, also bear and flourish almost beyond belief; and so I am induced to recommend, that in light soils, the peach tree border should be made as follows:— To a wall of moderate height, say nine or ten feet, a border six feet wide, and to a wall twelve feet high, one eight feet wide should be marked out; if the soil be poor and exhausted by cropping, or if it be an old garden, a dressing of rotten dung[1] and tenacious loam, or clay, equal parts, five inches in thickness, should be spread over the surface of the border: it should then be stirred to two feet in depth, and the loam and dung well mixed with the soil. The trees may be planted during the winter, and in March, in dry weather, the border all over its surface should be thoroughly rammed down with a wooden rammer, so as to make it like a well-trodden path; some light half-rotten manure, say from one to two inches in depth, may then be spread over it, and the operation is complete. This border must never be stirred, except with the hoe, to destroy weeds, and of course, never cropped: every succeeding spring, in dry weather, the ramming and

(1) *If the border* be new or rich with manure, a coat of the loam, or clay *only, four inches deep,* will be sufficient.

dressing must be repeated, as the soil is always much loosened by frost. If this method be followed, peaches and nectarines may be made to flourish in our dry southern counties, where they have hitherto brought nothing but disappointment.

PROPER DISTANCES FOR PLANTING PYRAMIDAL AND OTHER FRUIT TREES.

Pyramidal pear trees and bushes on quince stocks, to be cultivated as root-pruned trees for small gardens, four feet apart.

The same in larger gardens, not root-pruned, six feet apart.

Pyramidal pear trees on the pear stock, root-pruned, six feet apart.

The same, roots not pruned, eight to ten feet—the latter if the soil be very rich.

Horizontal espalier pear trees on the quince stock for rails or walls, ten feet apart.

Upright espaliers on the quince stock for rails or walls, four to six feet apart.

Horizontal espaliers on the pear stock for rails or walls, twenty feet apart.

Pyramidal plum trees, six feet apart.

Espalier plum trees, twenty feet apart.

Pyramidal apple trees on the Paradise stock, root-pruned for small gardens, four feet apart.

The same, roots not pruned, six feet apart.

Espalier apple trees on the paradise stock, fifteen feet apart.

The same on the crab stock, twenty feet apart.

Peaches and nectarines for walls, fifteen to twenty feet apart.

Apricots for walls, twenty feet apart.

Cherries, as bushes and pyramids on the

Mahaleb stock, root-pruned for small gardens, four feet apart.

The same, roots not pruned, six feet apart.

Pyramidal cherries on the common cherry stock, six feet apart.

Espalier cherry trees, for rails or walls, fifteen to twenty feet apart.

Standard pear, apple, plum, and cherry trees, for orchards, twenty feet apart.

Proper distances for trees against dwarf walls, annually or biennially removed (see page 37).

Pears on quince stocks, five feet apart.

Peaches, nectarines, apricots, and plums, five feet apart.

Cherries and apples, five feet apart.

APPENDIX.

THE PEACH TRELLIS OF THOMAS WHITE, ESQ., MANOR HOUSE, WEATHERSFIELD, ESSEX.

In the autumn of the year 1851, Mr. White, while walking through the grounds here, happened to see my small Ker's trellis with moveable lights, and on his return home the idea occurred to him that it might be enlarged, and the principle improved upon, so as to be able to grow fruit enough for a large family. In the autumn of that year he accordingly built a trellis-house of the following dimensions:—

Length	80 feet.
Width (inside)	12 feet.
Height at back	8 feet.
Height at front	14 inches.
Rafters (fixed 20 inches apart)	14 feet long.
Trellis (15 inches from the glass)	13 feet wide.
Sunken path in centre	2 feet deep.

The front and back plates both rest on larch poles about four or five feet apart; a shutter, twelve inches wide, on hinges, forms, with a slip of board, the front wall. The back wall is made with long faggots of brushwood—a double row; the ends are boarded up, and a door is at each end. Perhaps no gardening structure was ever built so cheaply, and none ever produced such marvellous

effects. The trees—dwarf and standard trained peaches and nectarines, two to three years trained, twelve of the former and six of the latter—were planted in February, 1852; and in the season of 1854, only the third year of their growth, they bore 5000 *peaches and nectarines.* On one tree of the Noblesse Peach there were 500 peaches, and the same number or more on a tree of the Elruge Nectarine. This seemed enough to ruin the health of the trees, and so I thought when I *heard* of it; but when I *saw* the excessive vigour of the trees, I thought Mr. White and his gardener not so far wrong in allowing them to bear such an enormous crop. The dwarf trees have reached to the top of the trellis, and cover it completely.

Mr. White, was, I believe, offered the sum that the house cost him—somewhere about £40—for his crop of peaches and nectarines in 1854. The vigour of the trees is quite astonishing; the stems of some of them are twelve or more inches in circumference: they are planted inside the front shutter, and laid directly on the trellis. The remarkable success of this simple structure seems owing entirely to the perfection of its ventilation; the front shutter has been open night and day in warm weather, and the air passes gently and constantly through its brushwood back wall, so as entirely to prevent stagnation. The trees have been syringed regularly night and morning, and are in the finest possible health.

As this brushwood wall is unsightly, and dangerous in some situations, owing to its capability of harbouring rats and mice, we must now *see what can be* substituted for its perfect venti-

lating property. Hedges to *lean-to* houses, as I know from experience, are too cold to ripen peaches and nectarines, although highly favourable to the growth of the trees; it therefore appears to me that the perforated bricks, now largely manufactured, could be used with advantage in this way. The wall, eight feet in height should be built five feet from the ground with common bricks; and then, three feet up to the top for the plate to rest on, with perforated bricks placed edgewise. In very cold weather in March, when the trees are in blossom, a curtain of calico, or any other convenient material, might be arranged so as to cover this space of the perforated wall at night, and in May it may be removed for the summer. This perforated space, with the front shutter constantly open, will, in my opinion, be perfect for a peach trellis, and not unsightly.

It will be seen from what I have said that Mr. White's trellis differs from Mr. Ker's in this way, —the roof is fixed, and not of removable lights; the trees are pruned and the fruit is gathered from underneath, so that all the operations of culture are performed under shelter, and in a climate at all times favourable.

Since the above was written, Mr. White has had his faggot-wall removed, and glass placed at the back, at a sharp angle of 30 degrees. Under this are trained peaches and nectarines, which succeed those under the front glass. The effect is excellent; and the trees, the late warm summer (1858), ripened their fruit well, although the slope is to the north-east. In cool seasons it is to be feared the flavour of the fruit will suffer.

The following letter, from a very clever amateur fruit-cultivator, will, I think, be found interesting to those who wish to make the most of a small garden:—

"*To Mr. Rivers.*

"DEAR SIR,—I have derived much pleasure from the cultivation of fruit trees in the different modes introduced by you,—as pyramids, bushes, and in pots under glass; and you will be glad to hear, as I am to tell you, that the pleasure has been greatly enhanced by success. Wishing to have a good many fruit trees, and my garden being a small one, I have resorted to many contrivances to make the most of my space; and knowing that the subject is one interesting to you, I venture to give you an account of some of them.

"About seven years ago, I put down on the east and west borders of one of my squares a row of stout and straight larch poles, eighteen inches in the ground, four feet above it, and three feet apart. These were sheeted, on the side next the walk, with half-inch boards, on the top of which was placed a rail two inches wide; stays were fixed against each end and against the centre, to prevent shaking by the wind; and all got two coats of paint. The entire cost of the structure, exclusive of the poles, which I happened previously to have, was sixpence for each running foot. Against those walls I planted, on the side next the walk, dwarf-trained pear trees on quince stocks and some *plum trees.* I then went to the other side of

my wall, and planted there as many more trees—placing them intermediately between those at the opposite side, so that the roots of one should not interfere with those of another. I had thus, on the space usually occupied by a single line of open espaliers, a double number of fruit trees, one half of them having an eastern and the other a western wall. The second year from planting I was rewarded by a nice crop; and although the trees were then young, the fruit, had I been disposed to sell it, would have realised more than the original cost of the walls: and this last year I have had against them as fine crops of Beurré d'Amanlis, Thompson's, Gansel's Bergamot (double-worked on the quince), Williams' Bon Chrétien, Chaumontel, and other pears, as need be desired, and also fair crops of greengage, purple gage, and Kirke's plums.

"I have not adopted wooden walls along my north or south borders, because one side would be useless; but instead of them I nailed cheap calico at the north side of some of my espalier rails which run east and west, thus giving to the trees next the walk a southern aspect. The calico is secured to the posts and to the rail at top by tape, in which numerous tacks are driven. When first put up it got a good coat of oil and black paint, and, with the exception of a few small holes made by accident and which can be easily repaired, it is now, in its third year. strong as ever, tight as a drum, and having the appearance and something of the sound of sheet-iron. I grew against those cotton walls this past year as fine corps of Joséphine de Malines, Maréchal de la Cour, Beurré d'Aremberg, and

Marie Louise pears, as the most ardent horticulturist could desire.

"There is another mode in which I have cultivated fruit trees; but it is right to say that the idea, although I had not seen it put in practice elsewhere, was taken by me from the 'Orchard and Fruit-Garden,' by Macintosh. I cut back to three or four buds some maiden pear trees grafted on the quince, and when they threw out three shoots I tied them down, so as to give to each a horizontal direction. The following year I placed round them eight stakes, about eighteen inches from the stem and equidistant from each other, and outside those stakes the branches were trained in a spiral form. I transferred some of those to the borders of the walk leading to my orchard house. The stakes round which the branches are trained are painted white, and secured in their proper positions by a hoop of round iron fastened inside the top. The trees look well, and bear well. A Passe Colmar managed in this way was loaded with fruit last year, and attracted much attention. I consider that this plan possesses many advantages,—the trees may be kept near the ground and thus have more heat, the air circulates freely inside them, the sun shines on every branch during some portion of the day, and the fruit, however large, is not liable to be blown down. The method might be called, not inappropriately, after that ancient and useful implement, the corkscrew; but if you find the term too homely, let it be *en tirebouchon.*

"With best wishes for your long life and *health, both* for your own sake and for the

interests of horticulture, on which you have already conferred so many benefits,

"I remain, dear Sir,

"Yours truly,

"JOSEPH MEADOWS."

THE GROUND VINERY.

A seven-feet length of ground vinery, the end at *b* open, to be joined to another seven-feet length with a closed end.

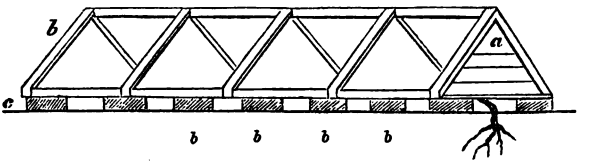


FIG. 13.

a Aperture 4 inches deep, for the egress of hot air.
c Ground level.
b Bricks.

The "Curate's Vinery," described in the last edition, was contrived by "Sigma," the well-known agricultural writer, and consisted of a ridge of glass placed over a furrow lined with slates, so that the bunches of grapes were suspended in the furrow, and in warm seasons ripened well. One objection to the furrow was its liability to be filled with water in wet weather in low situations and heavy soils. I therefore sought to remedy this, and one day, about the end of June, 1860, I found myself looking into my original "Curate's Vinery," and admiring the vines then in blossom, although those within a few yards of it growing in the open air were scarcely in full leaf. I pictured to myself the

bunches of grapes suspended from the vines in the warm, moist atmosphere of the trench lined with slates. My thoughts then reverted to my boyish grape-loving days, when, in an old vineyard planted by my grandfather, I always looked for some ripe grapes about the end of September; and I vividly remembered that I always found the best and ripest bunches with the largest berries lying on the ground, and if the season were dry and warm, they were free from dirt, and *de*licious (I think I always strongly accented the *de*), and so I gradually travelled in thought from bunches of grapes lying on the ground to *idem* lying on slates.

The idea was new, and I commenced at once to put it into practice by building a "Curate's Vinery" on a new plan.

I, therefore, placed two rows of bricks endwise (leaving four inches between each brick for ventilation), on a nice level piece of sandy ground, and then paved between them with large slates ("duchesses") placed crosswise. I am, however, inclined to think that tiles may be preferable to slates; absorption of heat is greater and radiation slower. On the bricks I placed two of the ridges of glass, as given in the foregoing figure, each 7 feet long, and thus formed my vinery 14 feet in length. One vine will in the course of two years fill a vinery of this length; but to reap the fruits of my project quickly, I planted two vines, one in the centre, the other at the north-east end; for these structures should stand north-east and south-west. One of these Vines which had been growing in a pot in the open *air was just beginning* to show its fruit-buds—

it was quite the last of June—its fruit ripened early in October, and were fully coloured and good in spite of the cloudy cold autumn. I, therefore, feel tolerably well assured that grapes lying on a floor of slates such as I have described, will ripen from two to three weeks earlier than in vineries of this description with a furrow, and as much earlier than grapes in a common cold vinery. Black Hamburghs and other kinds of grapes not requiring fire heat may thus be grown in any small garden at a trifling expense. I am, indeed, disposed to hope that the Frontignans, and nearly all but the Muscats, may be ripened by this method, so intense is the heat of the slated floor on a sunny day in July.

Some persons may think that the heat would be scorching, and that the leaves and grapes would alike become frizzled; but few gardeners know the extreme heat a bunch of grapes can bear. I remember a lady friend who had resided some time at Smyrna, telling me that one afternoon at the end of summer, when the grapes were ripening, she was sitting in her drawing-room and admiring some large bunches of grapes hanging on a vine which was growing against a wall in the full sunshine. Knowing the danger of going into the open air without a parasol, she rushed out, cut a bunch of grapes, and returned to her seat in the shady room. The bunch of grapes was so hot that she was obliged to shift it from hand to hand. I observed in the hot weather we had in July 1859, one or two bunches of Muscat grapes nearly touching the chimney of the stove in which a fire was kept up every morning, gradually turning into raisins. I felt of them when the sun was

shining on them, they were not burning hot but next to it.

I allowed them to dry into raisins, and very fine they were, but not better than the finest imported from Spain.

With respect to the superior ripening power of slates or tiles placed on the surface of the earth, I was much interested in once hearing a travelled friend say that when he was at Paros, he observed many vines trained up the marble rocks peculiar to the island; and in all cases the grapes lying on the surface, which was almost a continuous mass of rock, were ripe, while those a few feet from it, on the same vine, some of the branches of which were trained up the wall-like rocks, were quite green. In telling me this he said he was never more impressed with the ripening power of the earth's surface.

I have, in giving the figure and description of the ground vinery, made it adapted for one vine, the width of it being 2 feet 6 inches only. If this width be increased to 3 feet 6 inches two Vines can be trained under the same roof 14 inches apart, and thus at a trifling additional cost double produce can be obtained. I have very recently planted some peach trees in one of these slate-paved vineries, and feel assured that very early and very fine peaches can be grown in such places. I have managed my trees in this way—I took two pyramids full of blossom-buds, cut off the shoots on one side so that the stem would lie flat, and I then pegged it down with hooks made of stout iron wire, thrusting them into the soil between the interstices of the slates.

Cultivators will think of red spider making his

home in such (for him) a happy, hot place; but he may be made so uncomfortable by keeping flowers of sulphur strewed over the slates till near the ripening season, that no inconvenience need be apprehended. It will be perceived that the ventilation is all lateral, and on the same principle as that of my orchard-houses, nothing can be more perfect. In the figure it will be seen I have left a small aperture under the apex of the roof for the escape of rarefied air. In very hot weather this may be useful, but in my paved vineries I have not done this, and yet the ventilation is perfect. I have not yet ascertained in what manner the heated air escapes. The ventilating apertures are all on the surface of the soil, and at the same level; but I suppose it stoops to get out, having no other mode of egress.

I ought to add, that a ground vinery for peach trees need be but 10 feet long, in two five-feet lengths.

DIMENSIONS OF GROUND VINERIES.

No. 1, *for a single vine in centre.*

Width at base	30 inches.
Slope of roof	20 inches.
Depth in centre . . .	16 inches.

No. 2, *for two vines* 14 *inches apart.*

Width at base	42 inches.
Slope of roof	28 inches.
Depth in centre . . .	20 inches.

These dimensions need not be arbitrary, for ground vineries of larger dimensions may be made with every chance of success, and Hamburgh grapes grown in Bedfordshire instead of cucumbers, for

no part of England can be more favourable to grape culture than the fertile, sandy districts of a portion of that county. We have heard of forty acres of cucumbers being grown for pickling, and one day we may hear of forty acres of grapes in ground vineries in some favourable locality. I have only to add, that the ground vinery No. 1. can be had of Mr. Hughes, Bishop Stortford, in light cast iron, 21*s.* each, unglazed. It is cast in two lengths of 7 feet each, with two ends closed with sheet iron. A frame of wood of the same length and width can be made of wood by any carpenter for about 14*s.* The cast-iron ground vineries are adapted for glass about 20 inches wide, but those made of wood can be adapted for glass 1 foot wide, if thought more economical. Their size may also be increased, but they must then be placed on a wall two bricks in height, leaving four-inch interstices for ventilation, and I believe this will be advisable with No. 2. The glass used should be 21 oz., as 16 oz. is too slight.

In gardens where these glazed ridge-roofs are not wanted for vines or fruit-tree culture, they will be found most useful. They may be placed on any warm border on the surface of the soil; and early peas, French beans, and many other early vegetables requiring protection from spring frosts, be grown under them with advantage. For the cultivation of early strawberries they are invaluable, as they not only hasten the ripening period, but protect the fruit from heavy summer showers often so injurious to the crop, and also from birds. Strawberry plants to be cultivated in ground vinery No. 1 should be planted early in autumn in narrow beds of two or three rows,

the plants close together in the rows, so as to take full advantage of the glass-covered space. If in two rows, they should be 9 inches apart; if in three rows, 6 inches apart. The latter distance will probably crowd the plants too much; but as the beds should be made every season on a fresh piece of rich soil, as much fruit as can possibly be grown in such a limited space must be the aim of the cultivator. In all cases they should be placed on bricks, with spaces between them. Ventilation is then secured; and even cauliflower-plants in winter will do well without the constant attention to "giving air," so necessary in the old garden frame culture. In gardens that are confined and very warm, it may be necessary to have the ends not quite closed up, but a small opening left at the top, at *a* in the figure, just under the ridge, to let out the heated air. My vineries stand in a very exposed place, and do not require it.

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